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Report of the National Marine Fisheries Service for the Calendar Year 1978

July 1979

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

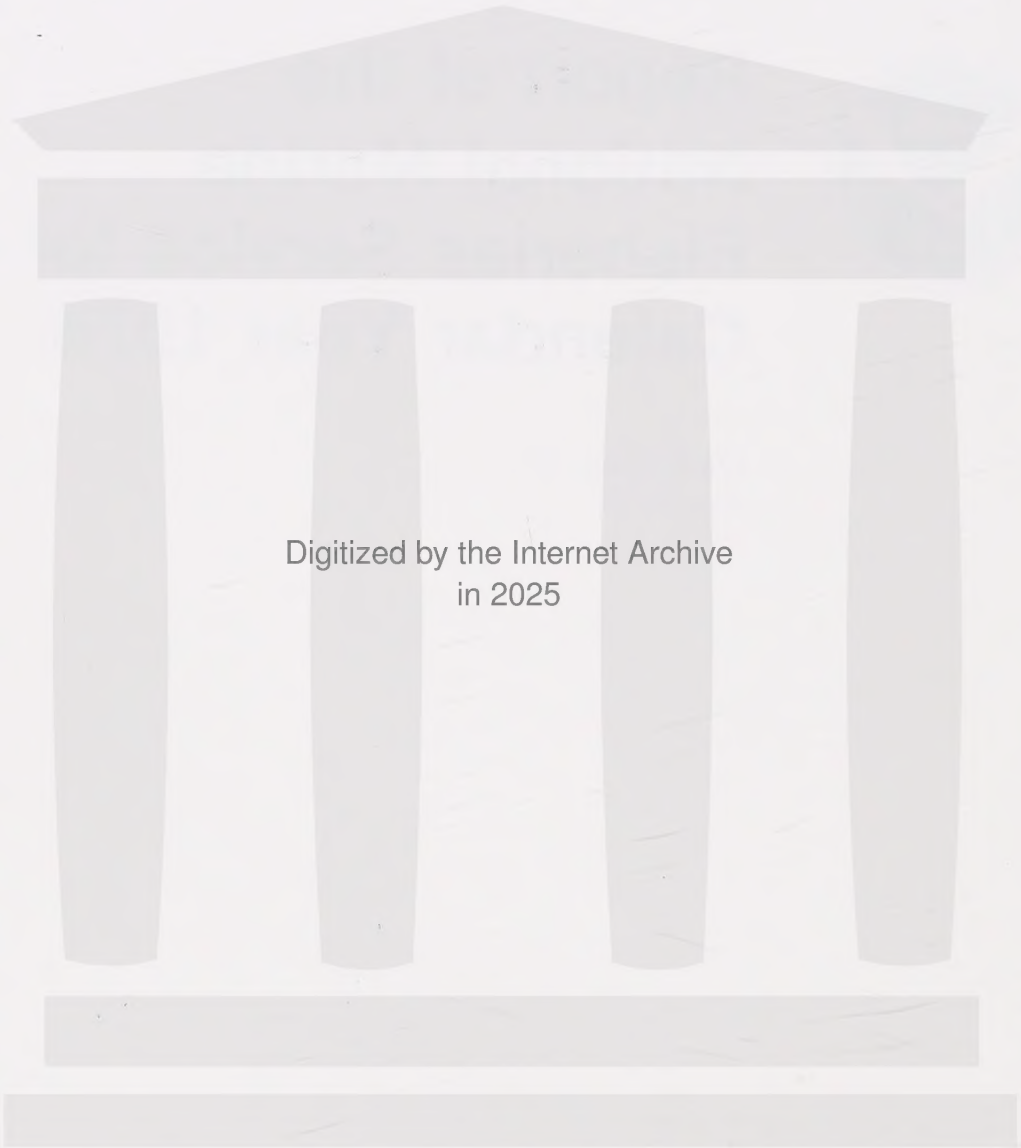
Report of the National Marine Fisheries Service for the Calendar Year 1978

Washington, D.C.
July 1979

U.S. DEPARTMENT OF COMMERCE
Juanita M. Kreps, Secretary

National Oceanic and Atmospheric Administration
Richard A. Frank, Administrator

National Marine Fisheries Service
Terry L. Leitzell, Assistant Administrator for Fisheries



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THE SECRETARY OF COMMERCE
Washington, D.C. 20230

11 SEP 1979

Dear Sirs:

It is my honor to submit to you the National Marine Fisheries Service Report for Calendar Year 1978 as required by Section 9(a) of the Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742(a)).

The report describes the Service's programs, activities, significant accomplishments, mission, and organization, as well as the status of the U.S. Fisheries. The report reflects the progress made in achieving the goals of research, utilization, and management of our marine fisheries resources in the national interest.

Sincerely,

Juanita M. Kreps

Secretary of Commerce

Enclosures

President of the Senate
Speaker of the House

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INTRODUCTION

This report, required by Section 9(a) of the Fish and Wildlife Act of 1956, as amended (16 USC 742h(a)), discusses the programs, activities, and accomplishments of the National Marine Fisheries Service (NMFS) for calendar year 1978.

YEAR IN REVIEW

Nineteen hundred and seventy-eight was the second full year in which U.S. fisheries in the fishery conservation zone (FCZ) were managed under the Fishery Conservation and Management Act of 1976 (FCMA). FCMA continued to have a profound effect on the fisheries of the United States.

Foreign catches in the U.S. FCZ reached a peak of 3.5 million metric tons of fish in 1971. By 1976, foreign catches there had been reduced to 2.3 million metric tons, partly through conservation treaties, but mainly because of depleted stocks caused by overfishing. FCMA went into effect on March 1, 1977, and allocations of catches to foreign vessels were established to rebuild the depleted stocks of fish. Foreign catches were held to 1.7 million metric tons in 1977 and to 1.8 million metric tons in 1978. On the other hand the U.S. catch broke records at 2.6 million metric tons in 1978, an 8-percent increase over 1976, the year before FCMA was implemented.

Through its management plans, the United States manages those fisheries that had been overfished by both domestic and foreign fishermen. Foreign fishing has been halted or cut back to levels that will aid in rebuilding more than a dozen U.S. fisheries. Domestic (as well as foreign) fishing is now also regulated for three species of Atlantic groundfish; Atlantic herring; surf clam and ocean quahog; commercial and recreational salmon off the coasts of Washington, Oregon, and California; the northern anchovy; the commercial Tanner crab off the coast of Alaska; and groundfish in the Gulf of Alaska. Fishing inside FCZ is controlled principally by area and season closures, gear restrictions, and catch quotas that limit quantity and/or effort.

Implementation of FCMA has had other results. In 1978, the United States had a program to place U.S. observers on foreign fishing vessels, with 20 percent coverage of the vessel days at sea. NMFS issued a total of 945 foreign vessel permits in 1978, of which 660 were active in FCZ during the year. The United States collected $12 million (an increase of $1 million over 1977) in poundage and vessel fees. Of the $12 million collected, $3 million was refunded, because the foreign fishermen were unable to harvest the allocated resources. Enforcement agents made 1,220 boardings of foreign vessels, and 51 notices of serious violations were issued to foreign fishermen in 1978. Agents boarded 2,364 domestic vessels, and 155 notices of serious violations were issued to domestic fishermen in 1978.

The total U.S. exports of domestic products rose to $906 million in 1978, up 74 percent from 1977. The total value of U.S. processed fishery products rose 20 percent in 1978 to $4.6 billion.

Successful trade missions and successful trial shipments have opened the door to substantial export sales of heretofore nontraditional species such as croaker, mullet, sardines, and other species taken by the shrimp fishery.

In 1978 a Department of Commerce Task Force on Fisheries Development Policy was formed to examine problems affecting the growth of the fishing industry. A fishery development program is an integral part of the NMFS program to achieve optimum management and use of the Nation's fishery resources. Through a fishery development program, NMFS intends to provide alternatives to management actions curtailing fishing operations to conserve fishery resources; develop economic growth by encouraging harvesting, processing, and marketing of less traditional species; reduce the $2.2 billion fishery trade deficit of 1978 by using American-caught fish to substitute for some imports and to develop export markets; and assure a steady U.S. controlled supply of seafood to contribute to improved nutrition in the United States.

Encouraging progress was made in 1978 in the reduction of porpoise mortality incidental to tuna fishing. In 6 years, the number of porpoise killed by purse seine fishing for yellowfin tuna has dropped almost 95 percent from an estimated mortality of more than 300,000 in 1972. As part of a 3-year management program, NMFS set quotas on the number of porpoises that could be taken in 1978, 1979, and 1980. The estimated porpoise mortality by U.S. fishermen was fewer than 15,000 animals in 1978, compared with 27,000 in 1977. The allowed limit was 51,945 in 1978.

NMFS also became more involved in protecting the marine habitat for living resources and making its views known to other parts of the Federal Government as well as the public. Along these lines, NMFS developed a national program designed to reverse downward trends in quantity and quality of fish habitats. Studies were made on important fish habitats to improve understanding of how human activities affect the productivity of marine fish habitats and how undesirable effects may be modified. Under the Fish and Wildlife Coordination Act, NMFS also advised other agencies how their proposed actions might affect fisheries.

In actions of particular significance to the marine habitat, NMFS reviewed the permit applications for locating two oil refineries on the East Coast. NMFS opposed construction on the sites that had been selected by the builders, because, among other reasons, possible oil spills could have a disastrous effect on the living marine resources in the areas.

In summary, 1978 was a year of continued growth to our commercial and recreational fisheries, increased management and conservation of our living marine

resources, and a year of reduced conflict among competing users of our available resources.

STATE OF THE FISHERIES

Domestic and Foreign Catches off U.S. Shores. Total catches from all areas by U.S. commercial fishermen and catches by foreign fishermen in the U.S. FCZ reached 4.6 million metric tons (10.0 billion pounds) in 1978, up 11 percent from 1977. This total excludes the weight of mollusk shells and estimated catches by recreational fishermen. The increase in the catch was due to a moderate increase in U.S. landings and a slight increase in the foreign catch.

U.S. Commercial Landings. Commercial landings from freshwater and marine fisheries by domestic fishermen at ports in the United States were a record 6.1 billion pounds (round weight) valued at a record $1.9 billion in 1978. The quantity landed in 1978 was 16 percent more than in 1977; the value was 22 percent more. The reason for the increase in quantity was sharply increased landings for fish meal and other industrial purposes.

Commercial landings of edible species in the United States were 3.2 billion pounds valued at a record $1.7 billion in 1978, up 10 percent in quantity and 23 percent in value from 1977. The quantity of edible fish and shellfish landed was the largest since 1951. The principal reason for the increase was greater landings of tuna, salmon, cod, and other groundfish, crabs, and oysters.

Commercial landings at U.S. ports of fish used for reduction to meal and for other industrial purposes were a record 2.9 billion pounds valued at a record $121 million in 1978, up 24 percent in quantity and 9 percent in value compared with 1977. The increase was attributed entirely to record landings of menhaden, which more than offset sharply lower landings of anchovy.

Foreign Catch in U.S. FCZ. In 1978, the foreign catch of fish (excluding tunas) and shellfish in the U.S. FCZ was 1,754,000 metric tons, up 3 percent from 1977, but several hundred thousand tons short of final allocations to foreign nations. The Alaska FCZ was by far the most important, accounting for 91 percent of the total. The FCZ off Washington, Oregon, and California accounted for 6 percent, and the Atlantic FCZ for 3 percent.

World Landings. In 1977, the most recent year for which data are available, world landings were 73.5 million metric tons (162 billion pounds), down 2 percent compared with the record 74.7 billion pounds reported for 1976. Japan was the leading nation with 15 percent of the total. The U.S.S.R. was second with 13 percent; mainland China was third with 9 percent; Norway, fourth with 5 percent; and the United States, fifth with 4 percent.

Prices. In 1978, U.S. exvessel prices (prices received by fishermen for their landings) for almost all species moved upward. The index (1967=100) for edible fish stood at 384.4 for 1978, up 12 percent from 1977. Among the exceptions to this upward trend were the exvessel prices for haddock, chum salmon, and hard blue crabs, all of which declined. The index for industrial fish was 293.6 for 1978, up less than 1 percent compared with 1977.

Processed Products. The value of domestic production of processed fishery products was $4.6 billion in 1978, 20 percent above 1977. The value of edible products increased to $4.2 billion, up 19 percent from 1977. The value of all categories of edible products increased, including fresh and frozen, canned, and cured. The value of industrial products was $481 million in 1978, up 29 percent compared with 1977. Increases in the value of both bait and canned animal food and fish meal, oil, and solubles more than offset a decrease in the value of "other" industrial products.

Foreign Trade. The total value of U.S. imports of edible and nonedible fishery products was a record $3.1 billion in 1978, up 18 percent from 1977. Both edible and nonedible imports of fishery products increased. Edible imports were 2.4 billion pounds valued at $2.3 billion in 1978, up 11 percent in quantity and 9 percent in value compared with 1977. Nonedible imports were a record $824.6 million in 1978, up 52 percent from 1977.

Total U.S. domestic exports of edible and nonedible fishery products were $905.5 million in 1978, up 74 percent from 1977. Exports of both edible and nonedible products increased. Exports of edible products were 448.3 million pounds valued at $831.7 million in 1978, up 35 percent in quantity and 76 percent in value compared to a year earlier. Exports of nonedible products were $73.9 million in 1978, up 57 percent compared with 1977.

Supply. The U.S. supply of commercial fishery products (domestic landings plus imports, round-weight equivalent) was 11.5 billion pounds in 1978, an increase of 9 percent compared with 1977.

Per Capita Consumption. In 1978, U.S. per capita consumption of fishery products was a record 13.4 pounds of edible meat per person, up from 12.8 pounds in 1977.

MISSION AND ORGANIZATION

The first "Fisheries Service" (U.S. Fish Commission) was established in 1871. Since that time, the "Service" has seen many organizational changes. However, the basic mission — to conserve and protect living marine resources — has not changed. Today the National Oceanic and Atmospheric Administration (NOAA) is the principal Federal agency responsible for living marine resources, and the National Marine Fisheries Service (NMFS) is the primary NOAA component responsible for regulating, managing, and protecting these resources.

While the mission has not changed, the goals and directions have, in many instances, changed and expanded because of the growth of ocean-use regulations and increased activity in today's living marine resource environment. The 1978 NMFS reorganization was designed to accommodate and facilitate the expanding and changing goals and directions. For example, a separate Office of Marine Mammals and Endangered Species was established to ensure that marine mammals and endangered species problems receive sufficient attention. The growing importance of environmental assessment functions was recognized by the establishment of an Office of Habitat Protection, and the importance of recreational fishing activities was affirmed by the designation of a senior policy official for Recreational Fisheries Coordination.

Figure 1 shows the relation of the headquarters staff to the Regional Offices and Centers; figure 2 presents the headquarters structure; and figure 3 shows NMFS Regions, their boundaries, and the principal field facilities.

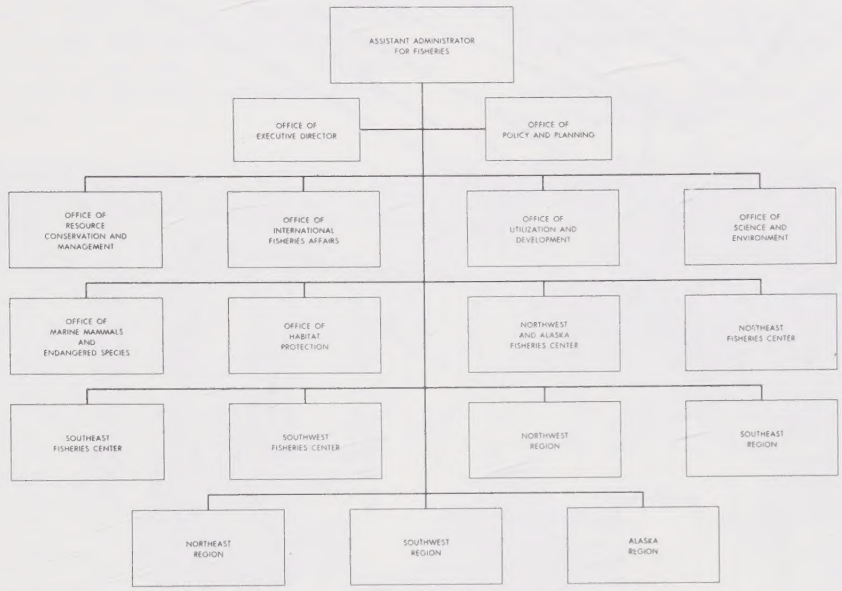


Figure 1.--NMFS headquarters and field organization.

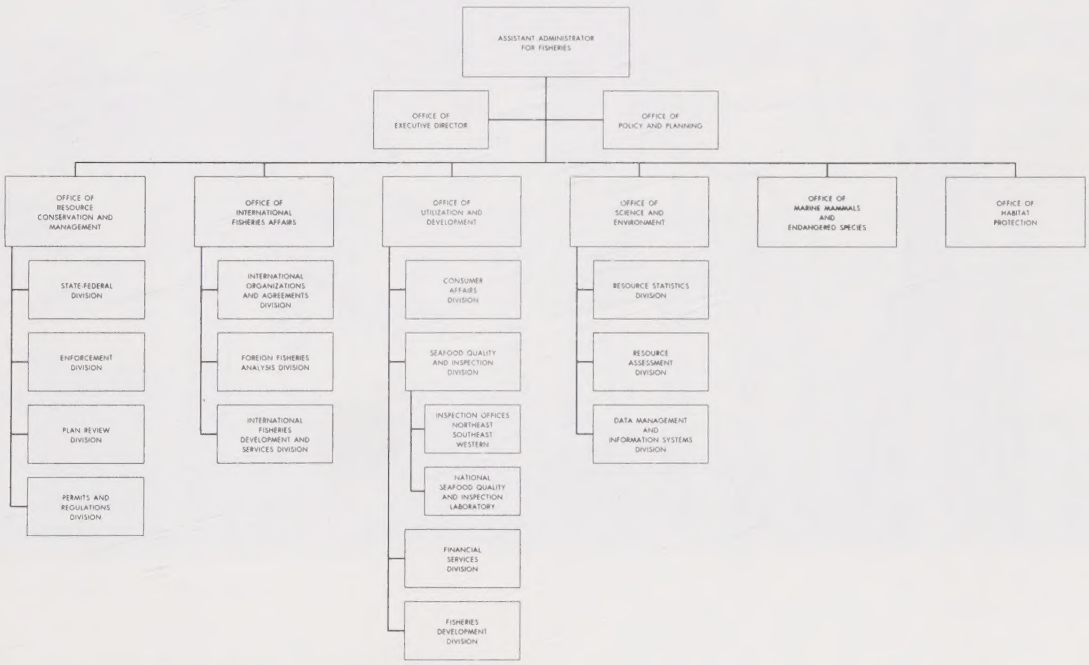

ASSISTANT ADMINISTRATOR FOR FISHERIES
OFFICE OF EXECUTIVE DIRECTOR
OFFICE OF POLICY AND PLANNING
OFFICE OF RESOURCE CONSERVATION AND MANAGEMENT
STATE-FEDERAL DIVISION
ENFORCEMENT DIVISION
PLAN REVIEW DIVISION
PERMITS AND REGULATIONS DIVISION
OFFICE OF INTERNATIONAL FISHERIES AFFAIRS
INTERNATIONAL ORGANIZATIONS AND AGREEMENTS DIVISION
FOREIGN FISHERIES ANALYSIS DIVISION
INTERNATIONAL FISHERIES DEVELOPMENT AND SERVICES DIVISION
OFFICE OF UTILIZATION AND DEVELOPMENT
CONSUMER AFFAIRS DIVISION
SEAFOOD QUALITY AND INSPECTION DIVISION
INSPECTION OFFICES NORTHEAST SOUTHEAST WESTERN
NATIONAL SEAFOOD QUALITY AND INSPECTION LABORATORY
FINANCIAL SERVICES DIVISION
FISHERIES DEVELOPMENT DIVISION
OFFICE OF SCIENCE AND ENVIRONMENT
RESOURCE STATISTICS DIVISION
RESOURCE ASSESSMENT DIVISION
DATA MANAGEMENT AND INFORMATION SYSTEMS DIVISION
OFFICE OF MARINE MAMMALS AND ENDANGERED SPECIES
OFFICE OF HABITAT PROTECTION

Figure 2.--NMFS headquarters organization.

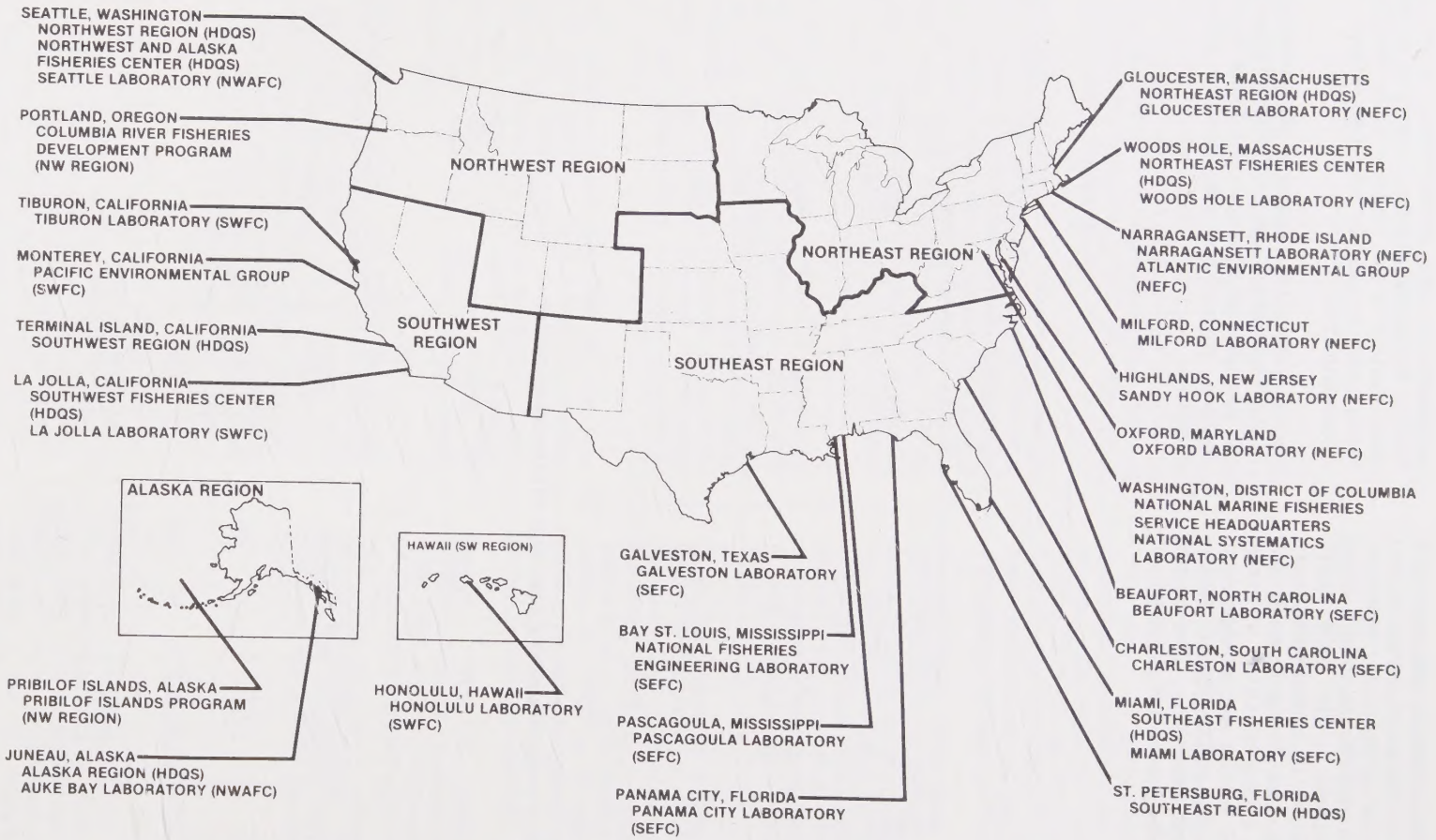


Figure 3.--NMFS principal facilities.

EXECUTIVE DIRECTOR
AREA CODE 202 634-7405
JANUARY 1979

Charleston Laboratory

The relocation of NMFS' College Park, Md., fisheries utilization and research laboratory to Charleston, S.C., has been in the planning stages for several years. The move was made in 1978, and the new laboratory was dedicated in October 1978. The new laboratory, situated at the South Carolina Marine Resources Center, is being leased to the Federal Government by the State of South Carolina, which constructed it at a cost of $3.8 million.

The primary responsibilities of the Charleston Laboratory (as were those of the College Park Laboratory) are to develop and provide technological information and related services to aid in the economic and safe use of fishery resources of the southeast United States.

These responsibilities include:

- providing for improved capability to detect chemical and microbiological public health vectors and evaluate their significance,
- identifying nutrients in industrial fishery products to provide guidance in their processing and marketing,
- identifying critical nutritive requirements for the culture of selected aquatic species (e.g., crustacean species),
- developing a technological information base necessary for rational fishery development, and
- providing for increased public awareness and confidence in fishery products.

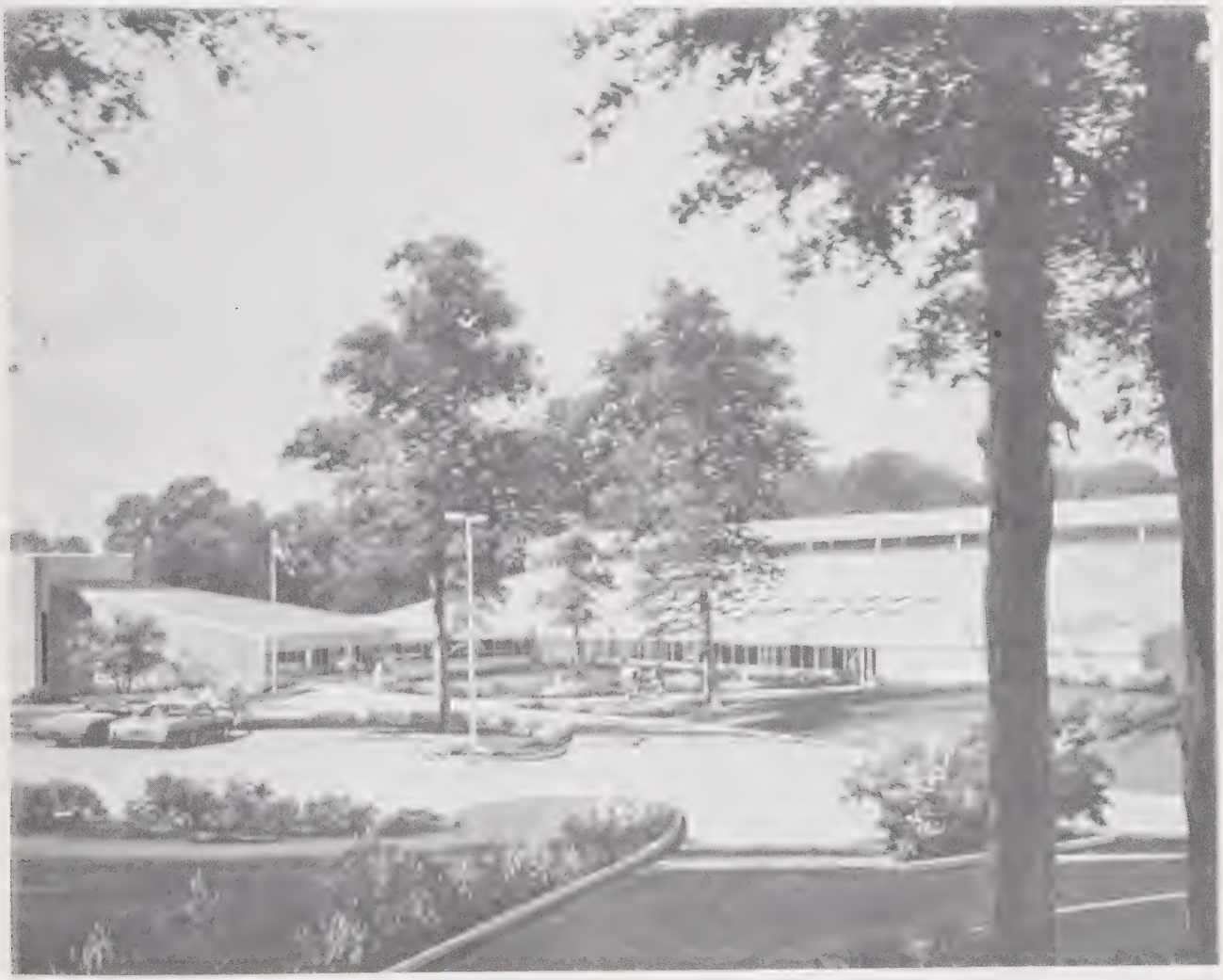


Figure 4.--Charleston Laboratory.

FISHERY MANAGEMENT

Implementation of FCMA

This was the second full year in which U.S. fisheries in the fishery conservation zone (FCZ) were managed under the Act. The Regional Fishery Management Councils entered 1978 with improved organization and operational experience. Progress was made on a considerable number of management plans during the year; seven were in effect by the year's end. In addressing fisheries not previously regulated, the Councils and NMFS were faced with a number of new legal and technical problems.

Among issues explored in depth during the year were the concepts of fishing fees and the limiting of entry to fisheries (both the subject of national workshops), and the sale or transfer of fish by U.S. harvesters to foreign processing vessels in the FCZ (called the joint venture operations).

Although a number of specific matters raised by fishery management plans were resolved, some important questions remain to be answered. Perhaps the most difficult is the effective management of fisheries in which a significant portion of the commercial and/or recreational harvest is taken in State waters. Unless the States cooperate in implementing plans for such fisheries, difficulties can arise in enforcing regulations. First, it may not be possible to determine the commercial and recreational catches in State waters accurately and promptly on a continuing basis. If managers cannot tell with certainty when catch quotas have been or will be reached, they cannot take prompt action called for by the plans, such as closing areas or limiting catches when quotas are attained. If State regulations are not consistent with those issued under management plans, fishing may continue in State waters after quotas established by plans are reached, leading to overfishing. Moreover, it is difficult to take enforcement action when catches in the FCZ are reported as being made in State waters. Weaknesses of this kind complicated effective management of the Atlantic groundfish and herring fisheries in 1978.

A second persistent problem is the providing of adequate data for fishery management and its acceptance by the fishing community. Data for many fisheries, especially those relating to the socio-economic aspects, are limited. Although NMFS and the Councils have authorized a number of studies on specific questions, the dearth of information is still great and the methodology for collection is relatively undeveloped. It will be a considerable time before complete information is available. Biological and environmental data on fishery resources have been developed to a much greater extent. Nevertheless, information for some fisheries is limited or nearly nonexistent. This is especially serious for many recreational fisheries and for those fisheries that have not been the subject of substantial commercial activity.

Related to the data problems is the need to improve technology and to broaden concepts for fishery management. Many short-lived species such as squid and shrimp do not lend themselves to management based on conventional population models. Species such as Atlantic mackerel that fluctuate in abundance for as yet unknown reasons, and apparently without relation to the size of spawning populations, present another difficulty. Restricted quotas may prevent catches from reaching optimum yield, although sudden declines in abundance may not lead to overfishing.

In many fisheries, the funds and time needed to gather and process data present problems. It is often difficult, as in the case of Pacific salmon, to assemble and analyze the complex information needed from many sources in time to consider, publicly review, determine, and implement appropriate changes in management for the following season's operations.

A final unsolved problem relating to data used in fishery management is public credibility. The language and methods of biologists, statisticians, economists, and anthropologists are unfamiliar to many connected with fisheries. Explanations in plans of the conditions of fish stocks may be too technical for wide understanding and acceptance. When practical fishing observations appear to conflict with the findings and predictions of scientists, the latter are naturally called into dispute by fishermen. Doubts about the scientific basis of plans can be further reinforced in fluctuating fisheries when fishermen may see evidence for the beginning of changes in stocks before lengthy survey and analyses techniques can confirm them. Regulation is not always accepted readily, and the process is even less acceptable if the basis on which it is founded is perceived to be unsound. There is an urgent need to explain more clearly and convincingly the methods used in stock assessments.

A serious difficulty in implementing the Act has been the complexity and length of the process for developing, approving, and implementing fishery management plans. Although the form of the plans and the procedures are laid down by the Act, a number of other general requirements have to be met in this process. This number includes those prescribed by the National Environmental Policy Act (NEPA), the Administrative Procedure Act (APA), the Federal Committee Advisory Act (FACA), and Executive Order 12044 - Improving Federal Regulation. Integrating all the provisions of these documents into the plan development and review process produces a closely interlocked and lengthy sequence of events. This sequence comprises 175 separate steps from plan submission to implementation, a process that takes 250 days. Such a tedious and complex operation may be tolerated for an initial plan, when full public review is essential. It is not, however, efficient for amending plans annually or taking implementing actions under the plans, especially under circumstances that call for prompt action.

At the urging of Councils, NMFS began a review designed to simplify and streamline these procedures. A series of broad options for securing administrative

relief was discussed with Council Chairmen in October 1978, and a review of specific ways to streamline the procedures was held with Council representatives in November. Based on the guidance obtained at these meetings, NMFS organized a series of national workshops to be held in the spring of 1979 with Council staffs and NMFS Regions to examine in detail how to improve the process. If administrative solutions appear inadequate to provide sufficiently flexible and simple administration of the Act, legislative changes may be considered.

Fishery Management Plans (New England)

Atlantic Groundfish (cod, haddock, and yellowtail flounder). During 1978, the New England Council designed a management system to limit the amount of fish landed through quarterly quotas, annual vessel class allocations, weekly catch limits, gear limitations, closed areas, and closures when the Council's specified quarterly and annual quotas were reached. The Council increased the optimum yield for cod and haddock to reflect the increased abundance of these species. The fishing year was changed from the calendar year to October 1 to September 30. New vessels continued to enter the fishery, and heavy fishing caused numerous temporary restrictions to limit landings to the amounts specified by the Council.

Atlantic Herring. The fishery management plan (FMP) for Atlantic herring governs fishing for adult herring in the FCZ. The plan was approved on December 11, 1978, and implemented by emergency regulation on December 20, 1978. The New England Council's plan superseded the preliminary fishery management plan (PMP) implemented by the Secretary of Commerce in 1977.

Atlantic Hakes. The foreign fisheries for silver and red hake off the Atlantic coast were governed by a PMP implemented by the Secretary of Commerce in 1977.

Fishery Management Plans (Mid-Atlantic)

Surf Clam and Ocean Quahog. Management continued under the Mid-Atlantic Council's FMP designed to limit landings of the declining surf clam resource and to stabilize the number of vessels in the fishery. The moratorium on surf clam vessels was extended until November 16, 1979.

Atlantic Squid. The foreign fisheries for squid were governed by a PMP implemented by the Secretary of Commerce in 1977. The Mid-Atlantic Council prepared and adopted a FMP for the squid fishery that was submitted to the Secretary in December 1978.

Atlantic Mackerel. The foreign fisheries for mackerel were governed by a PMP implemented by the Secretary of Commerce in 1977. The Mid-Atlantic Council prepared and adopted a FMP for the Atlantic mackerel fishery that was submitted to the Secretary in December 1978.

Other Finfish. The foreign trawl fisheries off the Atlantic Coast directed at hakes and squids also take other species of finfish as incidental catch. The foreign fishery for butterfish, river herring, and other finfish is governed by a PMP implemented by the Secretary of Commerce in 1977. The Mid-Atlantic Council prepared and adopted a FMP for butterfish that was submitted to the Secretary. The Secretarial review was initiated on December 6, 1978.

Fishery Management Plans (South Atlantic)

Billfishes and Sharks. Foreign fishing for billfishes (e.g., marlin) and sharks is governed by a PMP approved by the Secretary of Commerce in January 1978, and implemented in March 1978. Foreign fishermen were required to release all billfishes and prohibited sharks. The management area is the FCZ of the Atlantic Ocean, Caribbean Sea, and the Gulf of Mexico.

Fishery Management Plans (Pacific)

Anchovy. This FMP was implemented in September and addresses the problems of (1) a transnational stock; (2) protection of forage supplies for a large number of unknown or suspected predators of anchovy; (3) use for reduction, human consumption, and bait for recreational fishing; and (4) large fluctuations in spawning biomass as it relates to optimum yield. The plan also takes into consideration its effect on the California brown pelican, listed as an endangered species. Management measures include area closures, separate fishing seasons, size restrictions, and allocation of percentages of harvest quotas for different segments of the industry. The plan is unique, because it provides a formula using an annual resource assessment to determine optimum yield.

Salmon. The 1977 FMP for Commercial and Recreational Salmon Fisheries off the Coasts of Washington, Oregon, and California was the initial step in developing a long-term comprehensive plan to manage salmon stocks (primarily chinook and coho) off the Pacific coast. This plan was changed and extended through 1978. Management measures for 1978 were intended to allow for an ocean fishery, an "inside" fishery for gillnetters, Indian Treaty fishing rights, and adequate escapement for spawning. Implementation and enforcement of such a plan has relied heavily on State cooperation. To accomplish FMP objectives, salmon management areas were established with specific gear, season, and size restrictions for the commercial troll fisheries, and specific season, size, gear, and catch limits for the recreational fisheries.

West Coast Groundfish. The 1977 PMP was amended to apply to 1978 with only minor changes in the management regime. Foreign fisheries, which target

on Pacific hake, are controlled through a combination of season, area, gear, and quota restrictions. The PMP was amended in August to increase the foreign quotas when it became apparent that U.S. harvesters would not harvest hake at anticipated levels.

Fishery Management Plans
(North Pacific)

Tanner Crab. The FMP for Commercial Tanner Crab off the Coast of Alaska, implemented on December 1, 1978, governs fishing for all Tanner crab throughout the U.S. FCZ adjacent to Alaska. It supersedes the PMP for King and Tanner Crab of the Eastern Bering Sea. The major management objectives are to minimize fluctuation in stock abundance because of harvesting, prevent industry overcapitalization, and integrate management of Tanner crab stocks with those of other fisheries. The management measures, which are compatible with existing State regulations, include establishment of management areas with gear, harvest-level, season, sex, and size restriction. An important management feature is the ability to make in-season adjustment of areas and times in which fishing may occur to prevent damage to the resources if conditions change unexpectedly. At the end of 1978, the FMP was amended to extend its operation to October 31, 1979.

Groundfish of the Gulf of Alaska. This FMP, also implemented on December 1, 1978, replaces the PMP for the Gulf of Alaska Trawl fishery, and that part of the Sablefish PMP that pertains to the Gulf of Alaska. The PMP was amended several times in 1978 to close certain areas to foreign fishing and to release reserves. The FMP was amended several times, before implementation, to extend the FMP through October 1979 and to increase the level of reserves.

The FMP was designed to promote conservation of the groundfish resource, allowing for maximum long-term use and productivity of the stocks, with particular reference to food production, and conservation and rehabilitation of halibut stocks. The management measures establish optimum yield (OY) for major groundfish species in each of five major statistical areas. A portion of optimum yield is set aside to be allocated on a regular basis to domestic or foreign fisheries based on reassessment of U.S. harvesting capacity. Regulations establish the criteria and timing of any release of reserves. The flexibility provided by the "reserve" concept is designed to assure an adequate supply of fish to U.S. vessels wishing to sell or transfer U.S.-caught fish to foreign processing vessels at sea, and enables the reserve to be released during the season to foreign nations if U.S. harvest does not exceed anticipated levels.

Bering Sea Groundfish. The 1977 PMP, with minor modification, was extended into 1978. The primary management measures are quotas, although season and area restrictions are used to protect the halibut resource. The PMP was amended several times to adjust OY's, because of "underfishing" in 1977, and to apportion reserves to foreign fisheries.

Bering Sea Sablefish, Shrimp, and Snails. The 1977 PMP's for these minor foreign fisheries were extended into 1978 with little controversy or change.

Fishery Management Plan
(Western Pacific)

Seamount Groundfish Fishery. The 1978 PMP for seamount groundfish resources (alfonsins and pelagic armorheads) was essentially the same as the 1977 PMP.

See table 1 for information about additional FMP's and major plan amendments that were being prepared (or in process) during 1978.

Table 1.--Fishery management plans and major plan amendments prepared (or in process) during 1978

Plan	Council
Atlantic Groundfish (amendment)	New England
Atlantic Scallops	do
Silver Hake	do
Surf Clam and Ocean Quahog (amendment)	Mid-Atlantic
Atlantic Billfish	South Atlantic
Snapper-Grouper	do
King and Spanish Mackerel	do
Spiny Lobster	Caribbean
Shallow Water Reef Fish	do
Stone Crab	Gulf of Mexico
Gulf of Mexico Groundfish	do
Reef Fishes	do
Coastal Migratory Pelagic Fish	do
Gulf of Mexico Shrimp	do
Jack Mackerel Fishery	Pacific
Groundfish off California, Oregon, and Washington	do
Dungeness Crab Fishery	do
Pink Shrimp	do
Commercial and Recreational Salmon off the Coasts of Washington, Oregon, and California - amendment for 1979	do
King Crab	North Pacific
Bering Sea Shrimp	do
Bering Sea Groundfish	do
Surf Clam	do
Halibut off the Coast of Alaska[1/]	do
High-Seas Salmon	do
Precious Corals	Western Pacific
Spiny Lobster	do
Billfish	do

1/ Prepared in the event of U.S. withdrawal from the Halibut Convention.

Management of Fisheries Under International Agreement

Atlantic Bluefin Tuna. Domestic commercial and recreational fishing for Atlantic bluefin tuna was regulated to implement recommendations of the International Convention for the Conservation of Atlantic Tunas. Management measures used were open and closed seasons, quotas for purse seining, required reports of purse seine vessel catches, and a daily bag limit for recreational angling. Vessel owners and anglers were allowed, under permit, to catch, tag, and release giant bluefin tuna to supplement a NMFS tagging program for acquiring scientific information needed to conserve the fishery resource. On August 28, 1978, the regulations were modified to allow the purchase of bluefin tuna from fishermen at sea. Any tuna purchased at sea must be landed in the United States.

Enforcement

During 1978, NMFS Special Agents enforced a wide variety of Federal laws and regulations as well as provisions of various international treaties and agreements. The major enforcement emphasis during the year concerned commercial fishing activities, both foreign and domestic, regulated by provisions of FCMA. Tables 2 and 3 summarize FCMA violations and enforcement activities in 1978.

Both foreign and domestic efforts within the U.S. FCZ are controlled principally by area and season closures, gear restrictions, and catch quotas expressed in limitations on quantity and/or effort.

At sea, enforcement patrols by NMFS Special Agents are performed in cooperation with the U.S. Coast Guard. As mentioned in last year's report, agents continue to accompany Coast Guard offshore enforcement and surveillance patrols on an as-needed and as-available basis, but particularly when the presence of a trained fishery enforcement expert is required. During 1978, however, greater emphasis has been placed on alternative methods of maintaining compliance with fishery regulations - primarily by using U.S. observers aboard foreign vessels; by providing dockside inspections of catches, fishing gear, fishing vessels, landing records and logbooks; and by using the capabilities of the recently developed Enforcement Management Information System (EMIS).

During 1978, EMIS was used as a management tool to facilitate enforcement efforts and measure compliance of both foreign and domestic fishermen. Shoreside enforcement activity primarily involves U.S. fishermen; the at-sea effort focuses on both domestic and foreign compliance. Enforcement officials are now rapidly able to access current data reflecting the number, type, and name of foreign vessels permitted to operate within the FCZ, the number of vessel days on grounds, the catch as logged and reported by foreign vessels, recent vessel sightings at sea, and so on. EMIS also has instituted a monitoring and tracking system for the processing of violation cases.

FCMA authorizes the placement of U.S. observers aboard foreign vessels that fish within the U.S. FCZ. While the observers do not have a direct enforcement role or enforcement authority, because of the deterrent value of their presence and because the data collected by them is used by enforcement officials, they must be considered an element of the enforcement regime. While on board foreign vessels, observers estimate the quantity of fish harvested and sample the catch to determine species composition. This information is then used to determine compliance with fishery quotas and accuracy of reporting by foreign fishermen. Observers monitor compliance with fishery regulations and report to authorized enforcement officials any activity that violates Federal regulations.

Observers also collect biological data on selected species. These data are available to NMFS scientists who may use them to supplement other stock assessment efforts.

Foreign participants in FCMA-regulated fisheries pay the cost of the observer program. The U.S. Treasury, not NMFS is reimbursed. Billings for 1978 were about $1.5 million. The use of observers is currently the only effective way to determine foreign compliance with the most important aspects of the foreign fishery management regime (i.e., foreign fishery quotas including bycatch restrictions, the accuracy of foreign catch reports, and the harvest and treatment of prohibited species). The observer program is also the most cost-effective means of achieving compliance with critical harvest-related regulations.

During 1978, foreign governments worked effectively to improve compliance by their fishermen. An example of this cooperation was action taken by Japan in ordering a Japanese flagship to sail to Midway Island for United States judicial action after receiving a report that the vessel had been sighted fishing illegally in United States waters. However, there were also instances when foreign fishermen were concerned that severe limitations on fixed gear and fishing areas prevented them from harvesting the allocated amounts of available surplus resources.

While NMFS and the U.S. Coast Guard have been able to enforce foreign fishing regulations adequately, enforcement of domestic plans has been more difficult. Reported violations were related to closed areas, gear restrictions, and fish size restrictions, under the three FMP's in force during the full year. These FMP's were: (1) Commercial and Recreational Salmon Fisheries off California, Oregon, and Washington; (2) Atlantic Groundfish Fisheries (cod, haddock, and yellowtail flounder); and (3) Atlantic Surf Clam and Ocean Quahog Fisheries.

In terms of regulations and enforcement capability, the problems concerned with the States' territorial seas present a need to overcome certain conflicts of authority within overlapping jurisdictions. The conflicts must be settled before an integrated program is available for all U.S. marine fisheries. Present limited enforcement resources constrain the level of surveillance possible in the areas; therefore,

Table 2.--1978 Foreign vessel violations of the FCMA

	NMFS Regions					
	Northeast	Northwest	Alaska	Southwest	Southeast	Total
Reports of violation issued	194	18	32	29	8	281
Reports of violation downgraded or dismissed	25	1	10	9	0	45
Notices of violation issued	27	5	15	2	2	51
Notices of assessent issued	1	0	0	0	2	3
Violations closed with civil penalty paid	0	0	0	0	0	0

Table 3.--FCMA enforcement during calendar year 1978

	NMFS Regions					
	Northeast	Northwest	Alaska	Southwest	Southeast	Total
Domestic sightings	12,086	6,770	1,916	790	6,273	27,835
Foreign sightings	3,969	1,332	6,849	586	942	13,678
Foreign boardings	209	125	740	89	57	1,220
Reports of domestic violations	150	7	---	11	---	168
Reports of foreign violations	194	18	32	29	8	281
Domestic citations	47	5	---	---	---	52
Foreign citations	112	8	104	1	23	248
Foreign seizures	5	---	1	---	4	10

Figure 5

Figure 6

Figure 7

A fisheries research biologist, with the Northwest and Alaska Fisheries Center, in Seattle, Wash., spent a month aboard the Japanese trawler KOYO MARU NO. 3, as a fishery observer. Upper left photo (fig. 5) shows the biologist counting and weighing pollock in the factory of the KOYO MARU NO. 3. Adjoining photo (fig. 6) shows bag of Tanner crab being weighed. Below (fig. 7) a trawl catch of about 70 metric tons of pollock is hauled aboard the trawler.

Figure 8

Figure 9

Figure 10

Figure 12

Figure 11

A sampling of activities and experiences of NMFS fishery observers on foreign ships: ice coats an entryway onto the deck of a Japanese ship in the Bering Sea in winter (fig. 8); three NMFS observers sorting and measuring fish on a foreign trawler (fig. 9); an observer verifies the weight of boxes of processed Tanner crab, under close Japanese scrutiny (fig. 10); an observer transfers from one Soviet ship to another, using rope ladder looped between the two ships (fig. 11); another observer measures fish in the factory of Polish trawler TUNEK (fig. 12).

enforcement of domestic plans is difficult and effectiveness is restricted.

Recognizing that enforcement of domestic FMP's will become an even more critical problem as additional FMP's are implemented, enforcement contracts with the States are being considered as a means of using their existing and future enforcement capabilities in a joint Federal/State enforcement effort. The first of these agreements, for cooperative fishery law enforcement activities in the waters off California, is in place. This agreement between NMFS, the U.S. Coast Guard, and the California Department of Fish and Game) provides a basis for optimum deployment of State and Federal manpower and enforcement platforms. This agreement will also be facilitated by cooperative development and implementation of data-gathering procedures within EMIS. Additional agreements with other States are expected.

A significant part of NMFS' enforcement resources are used to enforce Federal statutes other than fishery laws. The Marine Mammal Protection Act and the Endangered Species Act prohibit, among other things, the killing, capturing, harassing and importing of certain marine mammals, reptiles, fish, and other living things. These Acts also restrict commerce in parts and products of these creatures. Instances of unlawful importation and interstate sale of such items as whale oil and etched whale teeth account for most investigative work under these two laws. Two other laws frequently enforced by NMFS Special Agents are the Lacey Act and the Black Bass Act, which prohibit the importation and interstate trafficking in fish and wildlife taken in violation of State and foreign laws.

Fishermen's Protective Act

An amendment to the Fishermen's Protective Act (Public Law 95-376, September 18, 1978) provides for compensation to American fishermen for certain damages or losses occurring in the fishery conservation zone. Payments to fishermen will be made from the Fishing Vessel and Gear Damage Compensation Fund established by this Amendment. The primary source of income for the fund is a surcharge (not to exceed 20 percent) on foreign fishing fees assessed each year under the FCMA.

Proposed regulations on the surcharge were published on November 1, 1978. The surcharge program was implemented by final regulations, which were published on December 21, 1978, and became effective on January 1, 1979. The regulations established a surcharge of 20 percent of which 10 percent ($1.4 million) was collected when the foreign nations paid their poundage and permit fees for 1979. The Assistant Administrator for Fisheries may reduce or waive payment of the outstanding balance of the surcharge based on a determination that the Fund is capitalized sufficiently.

Foreign Fishing Permits

A total of 1,429 foreign vessels applied for fishing permits in 1978, 43 less than in 1977. The number of permits issued increased from 927 to 945. Permits were issued to 90 vessels in the Atlantic billfish and shark fishery; permits were not required in 1977. More permits were issued to support vessels in 1978 than in 1977, whereas 24 fewer permits were issued to fishing vessels. (See tables 4 and 5 for additional information.)

Fees

Foreign governments paid more than $12 million in poundage and permit fees during 1978. (See table 6.) About $3 million of the poundage will be refunded, because the foreign fishermen were unable to harvest the allocated resources. The fee schedule for 1978 was essentially the same as the one for 1977, except that the charge of $200 per vessel in a nonretention fishery was added in 1978 and the poundage fee for 1978 was based on landing data for 1976.

Allocation and Catch by Foreign Countries

Foreign countries are allocated that portion of the optimum yield (OY) that is surplus to domestic capacity. The total allocations for which fees were paid in 1978 were 2,078,109 metric tons—188,593 metric tons more than in 1977. The catch (preliminary) in 1978 was 1,717,054 metric tons, 361,055 less than the allocations. Table 7 summarizes the allocations by country. Some countries did not have as many fishing vessels available as originally anticipated; others withdrew vessels before the end of the season and for these and other reasons did not fulfill their allocations. The situation was most evident in the Atlantic fisheries. Regulations that limited the areas open to foreign fishing and the fee structure may have contributed to the failure of countries to reach their allocations of certain species in this region or, at least, may have discouraged their full participation. These problems are being reviewed, and attempts to alleviate the situation will be undertaken in 1980.

Joint Ventures

After extensive review and consideration of comments received at public hearings, NOAA published (Federal Register, May 12, 1978) ground rules allowing foreign vessels to receive fish caught by U.S. vessels. Permits for these "joint ventures" were issued to two countries. South Korea and the U.S.S.R. were limited to a total of 51,640 metric tons of United States-harvested pollock and incidental species in the Gulf of Alaska. South Korean vessels actually received less than 100 metric tons during the operation. U.S.S.R. vessels did not undertake operations. U.S.S.R. vessels also were permitted in the Pacific hake fishery, but were limited to a total of 10,000 metric tons of United States-harvested Pacific hake from California to Washington. The vessels actually received less than 1,000 metric tons before completing the season.

On August 28 the President signed Public Law 95-354. This law amends FCMA to require FMP's to specify the capacity of U.S. fish processors and the extent to which that capacity will be used to process fish harvested by U.S. fishermen. Only that portion of the U.S. harvest that will not be used by U.S. processors may be available for receipt by foreign fishing vessels. On October 20, NOAA proposed amendments to implement the law. Comments from the public were being reviewed at the end of the year.

Table 4.--Foreign fishing under FCMA, vessels permitted to fish by fishery (1978)

Number of permits issued		Total
Fishing vessels	Support vessels	
90	0	90 - Atlantic Billfishes and Sharks (ABS)
411	224	635 - Bering Sea and Aleutian Islands (BSA)
23	113	136 - Crab (Bering Sea) (CRB)
156	222	378 - Gulf of Alaska Groundfish (GOA)
138	112	250 - Northwest Atlantic Ocean (NWA)
26	142	168 - Sablefish (Gulf of Alaska) (SBL)
1	0	1 - Seamount Groundfish (Western Pacific) (SMT)
20	94	114 - Snails (Bering Sea) (SNA)
99	75	174 - Washington, Oregon, California Trawl (WOC)

Table 5.--Foreign fishing under FCMA, permits issued by country and fishery (1978)

Nation	Total permits issued	Permits used		Fishery	By fishery	
		Fishing vessels	Support vessels		Fishing vessels	Support vessels
Euro. Econ. Comm.						
Fed. Rep. of Germany	1	1	0	NWA	1	0
Italy	17	17	0	NWA	17	0
Other Nations						
Bulgaria	3	1	2	NWA	1	2
Japan	590	444	146	ABS	90	0
				BSA	300	146
				CRB	23	113
				GOA	43	139
				NWA	18	84
				SBL	23	138
				SMT	1	0
				SNA	20	94
Mexico	22	22	0	GOA	2	0
				NWA	20	0
Poland	17	12	5	GOA	8	3
				NWA	4	2
				WOC	8	3
Rep. of Korea	22	15	7	BSA	12	5
				GOA	12	7
				SBL	3	4
Romania	1	1	0	NWA	1	0
Spain	51	51	0	NWA	51	0
Taiwan	9	8	1	BSA	8	1
				GOA	0	1
U.S.S.R.	212	116	96	BSA	91	72
				GOA	91	72
				NWA	25	24
				WOC	91	72
Total	945	688	257			

1/The sum of total permits issued is less than sum of fishery figures because of permits issued for two or more fisheries.

2/Acronyms defined in table 4.

Table 6.--Fishing fees charged for the year 1978

Foreign country	Poundage fees	Permit fees	Total fees
		Dollars	
Bulgaria	13,646.55	2,867.00	16,513.55
Cuba	79,478.95	8,122.00	87,600.95
Germany, West	15,300.14	3,183.00	18,483.14
Italy	112,113.95	22,181.00	134,294.95
Japan	6,734,540.22	288,655.00	7,023,195.22
Korea	429,982.09	57,949.00	487,931.09
Mexico	221,402.54	12,009.00	233,411.54
Poland	144,918.11	28,468.00	173,386.11
Romania	18,025.35	2,681.00	20,706.35
Spain	309,604.01	20,304.00	329,908.01
Taiwan	24,018.85	6,377.00	30,395.85
U.S.S.R.	3,687,532.22	324,245.00	4,011,777.22
Total	11,790,562.98	777,041.00	12,567,603.98

Table 7.--Foreign allocation and catch--1977 and 1978[1/]

Country	1977		1978	
	Allocation	Catch	Allocation	Catch
		Metric tons		
Bulgaria	4,330	1,416.9	1,504	12
Cuba	2,693	68.9	10,715	0
France	1,200	.0	1,895	0
Germany, East	9,291	.0	---	---
Germany, West	6,525	.0	1,498	0
Italy	4,734	3,257.0	8,696	5,320
Japan	1,145,095	1,082,687.0	1,250,308	1,182,495
Korea	81,190	80,158.5	113,453	101,920
Mexico	---	---	15,528	3,954
Poland	44,544	18,943.0	61,576	28,873
Romania	---	---	1,813	140
Spain	21,069	12,406.0	22,340	13,653
Taiwan	5,510	1,503.0	6,285	3,228
U.S.S.R.	563,335	299,258.7	582,498	377,459
Total	1,889,516	1,499,699.0	2,078,109	1,717,054

[1/]Allocations for which fees were paid. Catch for 1978 preliminary.

MARINE RECREATIONAL FISHERIES

The Marine Recreational Fisheries Staff Office works with scientific and technical services personnel to provide program direction, prepare program plans, direct and monitor research activities on recreationally important species, interface with recreational constituency groups, and provide advice and guidance on marine recreational fishery activities.

Research on species important to marine recreational fishermen carried out at all four NMFS Fisheries Centers is coordinated through the regional and Washington offices.

Northeast Region and Northeast Fisheries Center

Recreational fishery personnel in the Northeast Regional Office spent much of their time in 1978 working on bluefin tuna matters. These activities included holding and participating in public hearings on bluefin management strategies, developing regulations for the domestic bluefin tuna fisheries, and monitoring the domestic catch of bluefin tuna. Also monitored was the charter and party boat catch of cod and haddock; this information was given to the New England Fishery Management Council. Additional activities included collecting specific information on bluefish and weakfish fisheries in the Mid-Atlantic area, and communicating regularly with numerous recreational fishery constituents.

The Northeast Fisheries Center made recreational fishery surveys throughout the Mid-Atlantic region, specifically on the bluefish, mackerel, and summer flounder. Additionally, a new program of sampling the catches of headboats and charter vessels for species, lengths, weights, and biological samples began in Southern New England.

Biological and ecological studies of oceanic gamefish concentrated on the large sharks of the Northwest Atlantic. More than 2,000 cooperating fishermen on the American and European Atlantic coasts helped to tag 4,000 sharks of 30 species. Tags were returned from 215 sharks of 25 species that had been at liberty up to 6 years and had traveled as much as 3,000 miles. These returns gave important information on the movements, foods, growth rates, reproduction, and physiology.

Southeast Region and Southeast Fisheries Center

A new Recreational Development Services Branch was established within the Fisheries Development Division of the Southeast Regional Office in July. The Branch is the focal point for interaction with saltwater sport fishing interests in the Region and has developed a work program that concerns the major issues of these constituents. During 1978, the Branch developed constituency mailing lists and other lines of communication; participated in the development and/or implementation of two national surveys designed to improve the recreational fishing data base; assisted Southeastern States and the Gulf and South Atlantic Fisheries Development Foundation in artificial reef program development efforts; and helped Regional Fishery Management Councils develop FMP's of interest to marine recreational fishermen.

Center personnel working on bluefin tuna and billfish participated in the Ninth Regular Meeting of the Standing Committee on Research and Statistics and a special meeting of the International Commission for the Conservation of Atlantic Tunas, November 8-22, 1978.

Staff members of the bluefin program are continuing to compile and evaluate 1978 catch and biological data from the United States and Canadian fisheries. These data were analyzed in preparation for making recommendations to the Northeast Regional Office for fishing regulations during the 1979 fishing season.

Personnel from the Oceanic Game Fish Investigations Program completed an assessment paper that indicated blue marlin in the Atlantic are apparently being fished beyond maximum sustainable yield (MSY) and that white marlin are being fished at or near the MSY level. The analysis pointed out, however, that problems in adjusting nominal fishing effort from the longline fishery may affect seriously the shape of the production curve and the positioning of the points on this curve.

The Rosenstiel School of Marine and Atmospheric Science completed and delivered a final report on spawning of blue marlin in the Atlantic Ocean. The study summarized time and area of spawning, size at first maturity, and fecundity, and presented a detailed histological study of the reproductive organs of blue marlin.

The Technical and Information Management Services of the Center completed a mail and telephone survey of the billfish and sharks caught off the Atlantic coast and provided the data to scientists of the Oceanic Game Fish Investigations to help update stock assessments.

During 1978, several activities contributed directly to the Center's program for bluefish and mackerel management. These included estimating size composition, age, growth, reproduction, and food habits of three species; holding a mackerel colloquium under the auspices of the Gulf States Marine Fisheries Commission; completing a bibliography on mackerels; and collecting catch and effort data along the Atlantic coast.

Activities related to reef fish management continued during 1978. The Center personnel completed the seventh year of monitoring South Atlantic headboat fishery for catch size, effort, species composition, and size of fishes in the catch and expanded their activities to include all headboats from Cape Hatteras to Key West. They collected bioprofile materials from all important species of reef fish in the South Atlantic area, and from red porgy, red snappers, and vermillion

snappers, in the Gulf of Mexico. They completed an analysis of yield per recruit of South Atlantic reef fishes. In addition to a number of other in-house activities, the Center cooperated with State and university personnel in several important research efforts including the development of methodologies to assess reef fish stocks.

Southwest Region and Southwest Fisheries Center

The Southwest Region's contract with California Department of Fish and Game for creel surveys of recreational fishermen at launching ramps, hoists, marinas, and other sites expired June 30, 1978. The State plans to take over the project with internal funding. These surveys provide data on catch, effort, species composition, and length frequency of fishes caught by southern California recreational fishermen. The data are proving to be useful for stock assessment and evaluation of the effectiveness of current measures for recreational fishery managements.

Five years in the preparation, the first printed edition of the Southwest Fishery Center's Anglers' Guide to the United States Pacific Coast went on public sale in March 1978. Government Printing Office copies sold briskly, and the book received many complimentary reviews from the press. By the end of the summer, the first printing had been depleted and the Guide went into a second printing. The 139-page Guide won Third Place in the Governmentwide Blue Pencil Competition and First Place and Best of Show in the Northwest Technical Publication Competition.

Experimental saltwater pen rearing and release of salmon by the Center's Laboratory at Tiburon, Calif., in cooperation with a sportfisherman's organization, has resulted in unexpectedly high returns to the recreational ocean salmon fishery in 1978. Tag recoveries from a 1976 release of 11,000 king salmon increased sharply this year and indicate a catch and escapement rate of 22 percent. This rate compares favorably with the average 5 percent return of yearling and 0.5 percent return of fingerlings released by State hatcheries. These latest results indicate that saltwater pen rearing may be useful in the management and propagation of California salmon.

A major problem in assessing the number and kinds of recreational fishes in the area of the California Current has been inability of fishery biologists to identify the early stages of development. Larvae and juveniles, unlike the adults, can be caught easily in plankton nets and used to determine the distribution and abundance of adults. For the first time ever, the larval stages of all the croakers of the California current have been successfully reared in captivity at the La Jolla, Calif., experimental aquarium.

Northwest Region and Northwest and Alaska Fisheries Center

Northwest Regional Office coordination activities continue to involve State fishery agencies, recreational fishery organizations, and contracting researchers. Cooperative development of effort and catch data from recreational fisheries has provided information to the Pacific Fishery Management Council for the salmon management plan. A research contract was developed to provide socioeconomic descriptors of the Nation's marine recreational fisheries, a contractor was selected, the contract executed, and the project is now underway.

At the Center, studies were started on early life histories of several reef fishes of recreational importance. Tagged fish continue to be recovered from a prior experiment, and the analysis and writing of the experiment are in an advanced stage. Technical papers are being prepared on prior experiments on nonsalmonid species with high recreational potential.

STATE/FEDERAL JOINT PROGRAM RELATIONS

State/Federal joint programs are another key element of NMFS national management programs. NMFS administers three activities in this area.

The Commercial Fisheries Research and Development Act of 1964 (Public Law 88-309 as amended, 16 U.S.C. 779-779f) authorizes the Secretary of Commerce to cooperate with the 50 States, American Samoa, Guam, Northern Marianas, Puerto Rico, Trust Territory of the Pacific Islands, and the Virgin Islands in carrying out research and development of the Nation's commercial fisheries. Activities eligible for funding include research, development, construction, and coordination. Cost-sharing projects are funded up to a 75 percent level of Federal participation for research and development, whereas projects to alleviate resource disasters and to establish new commercial fisheries may be financed with 100 percent Federal funds. The present base level funding is $5 million per year. Distribution of funds is made by a legislative formula established by the Act.

In 1978, 41 projects were completed at a total cost (both State and Federal) of about $4 million. Research and development emphasis was placed on shellfish and the collection of fishery statistics on the Pacific coast, Alaska, and the Gulf of Mexico; on commercial production of catfish and increasing the markets for underused species in the inland and Great Lakes States; and on finfish research and market development on the Atlantic coast. The 134 projects totaling more than $15 million are continuing at different levels of activity. No resource disaster or new commercial fishery development projects were begun.

The Anadromous Fish Conservation Act of 1965 (Public Law 89-304, as amended, 16 U.S.C. 757a.f.) authorizes the Secretary of Commerce to enter into cooperative agreements with the 31 coastal and Great Lakes States and other non-Federal interests for the conservation, development, and improvement of the anadromous fishery resources of the Nation and for control of the sea lamprey. The program is administered jointly at the Federal level by NMFS and

the U.S. Fish and Wildlife Service (FWS). Federal funds up to 50 percent may be used to finance projects. Federal share of project cost may be increased to a maximum 66 2/3 percent when two or more States, having a common interest in a river basin, jointly enter into a cooperative agreement with the Secretary.

In 1978, the NMFS base level funding was $2 million. Seven projects were completed at an estimated cost (both State and Federal) of more than $1 million. Emphasis was placed on the Pacific salmon resources of the Pacific coast States and Alaska, on river herrings in Atlantic coast States, and on striped bass in the Gulf of Mexico coastal area. The 47 projects are continuing at different levels of activity at a total cost of about $18 million.

The State/Federal Fishery Management Program (SFFMP), started by NMFS in 1971, helps the coastal States establish effective management of interstate fisheries within the territorial sea. SFFMP also seeks to complement, and where possible, augment activities under the Fishery Conservation and Management Act (FCMA) to develop and implement fishery management plans (FMP's) within the territorial sea. The approach is to (1) work with States and Interstate Marine Fisheries Commissions, through State/Federal Fisheries Management Boards, to identify and set priorities for fisheries in the territorial sea for management plan development; (2) provide financial support to the States through contracts for specific studies leading to plan development and implementation; and (3) provide financial support to the Interstate Commissions to facilitate overall planning, communication, and coordination for project development and implementation within their purview.

The following reviews NMFS Regional State/Federal joint program activities:

Northeast Region

State/Federal Fishery Management Program

SFFMP continued its support, with active industry participation, for management plan development and/or implementation of management for five species, with the probability of additional species being added in the next 2 fiscal years. Program activities during 1978 were diverse and successful.

American Lobster (Homarus americanus). In October 1978, the Northeast Marine Fisheries Board adopted a plan for uniform management of the lobster fisheries within the territorial sea. Acceptance of the plan, which was prepared by NMFS personnel in cooperation with the Lobster Scientific Committee, marks the successful completion of the second phase of the State/Federal Lobster Management Program. This follows completion of the initial phase begun in 1972 to develop cooperative data acquisition, exchange, and analyses among the 11 lobster-producing States along the northeast seaboard. In the third phase of the program, efforts will be directed toward implementing the plan through adoption of appropriate management programs and fishery regulations by each of the States involved.

Extensive informal meetings with industry to discuss potential problems of lobster management were held by each of the States having lobster fisheries within their territorial waters.

Northern Shrimp (Pandalus borealis). Management continues under Amendment One of the Atlantic States Marine Fisheries Commission Charter. During 1978 a harvesting moratorium was imposed on the fishery to alleviate fishing pressure on this severely depressed stock.

Resource monitoring is being carried out through support from Public Law 88-309, NMFS Northeast Fisheries Center, and SFFMP.

Striped Bass (Morone saxatilis). A Scientific and Statistical Committee and a Regional Citizens' Advisory Committee, both reporting to the Striped Bass Sub-Board, were formed to prepare a management plan development document. As a first step toward this effort, the two committees began to define objectives necessary for managing the resource.

Federal Grant-in-Aid Program

During this period, 67 Federal Aid projects were ongoing. They included research, development, improvement, and services, with a total cost of about $4.7 million. Of this number, 55 were financed under Public Law 88-309; the remaining 12 projects used monies made available through the Anadromous Fish Conservation Act.

A revised edition of the Grant-in-Aid for Fisheries Handbook was distributed to participating agencies and appropriate NMFS elements in late November 1978. This revision incorporated changes instituted since the previous Federal Aid for Fisheries Handbook was issued in August 1977.

Southeast Region

State/Federal Fishery Management Program

The total FY 1978 SFFMP contract base ($100,000) was awarded to the Gulf States Marine Fisheries Commission (GSMFC), and the following projects were subcontracted during the reporting period (calendar year 1978):

1. Survey of the shrimp recreational fishery.
2. Menhaden catch/effort relationships.
3. Profile development for spotted sea trout and red drum.
4. Study of menhaden tagging mortality.

5. Development of a menhaden data bank.

6. Simulated implementation study of the menhaden management system.

A new concept was explored with the Gulf States to increase the involvement of GSMFC in SFFMP activities and provide an improved mechanism for developing and implementing fishery management plans in the territorial sea. Under this concept, the responsibilities of GSMFC would complement those of the Gulf of Mexico Fishery Management Council, established under FCMA, to provide an effective system for addressing the management of stocks throughout their range.

The Gulf State/Federal Fisheries Management Board and the South Atlantic State/Federal Fisheries Management Board agreed upon alternate year use of SFFMP programmatic contract funds with the stipulation that $10,000 be held in reserve for use by either board in the event of an emergency. Under this arrangement, the South Atlantic Board received $90,000 for fiscal year 1979. The board approved the expenditure of a portion of these funds to extend the South Atlantic Regional Shrimp Statistics Program through the remainder of the fiscal year (February 1 to September 30, 1979). Alternative sources of funding will be necessary to continue the program for shrimp statistics collection beyond the current fiscal year.

Preliminary discussions on a joint Federal/State FCMA enforcement program were held with all coastal States, Puerto Rico, and the Virgin Islands. Immediate problems were identified (i.e., communications, Federal funding, training of State officers, and procedures for case processing). Each State designated a FCMA enforcement coordinator; followup training sessions for State officers were completed in Puerto Rico and the Virgin Islands.

Federal Grant-in-Aid Program

The Grant Program Administration Branch of the Southeast Region is responsible for assisting 17 States, Puerto Rico, and the U.S. Virgin Islands with the administration and execution of grants under the Commercial Fisheries Research and Development Act (Public Law 88-309) and the Anadromous Fish Conservation Act (Public Law 89-304). The 19 grantees obligated 96 percent of their fiscal year 1979 Public Law 89-304 allocation of $1,903,000 within a few days after the funds were appropriated in October 1978. Six coastal States (Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina) obligated over $137,000 for eight fiscal year 1979 anadromous fish projects. (See tables 8 and 9 for information about projects.)

Table 8.--Anadromous fish conservation program projects pursued by Federal grantees - FY 1978

Nature of project	States (grantees)
Produced striped bass for reintroduction into Northern Gulf estuarines	Alabama Louisiana Mississippi
Completed a cooperative project to develop management plans for anadromous fishes	Georgia South Carolina
Monitored fishery resources in the Neuse and Cape Fear Rivers	North Carolina
Completed research on the aquaculture of the American shad	Georgia
Initiated surveys of American shad fisheries to develop a data base for management	Georgia South Carolina

Table 9.--Commercial Fisheries Research and Development Act projects pursued by Federal grantees - FY 1978

Nature of project	States (grantees)
Used silo-raceway system for trout aquaculture test	New Mexico
Developed information on, and began testing techniques for management of fisheries in larger freshwater impoundment	Kansas
Developed two river access areas for commercial fishermen	Arkansas
Gathered information to protect river fisheries	Missouri, Nebraska
Tested reservoir and/or stream commercial fishery management techniques	Iowa, Kentucky, Oklahoma, Tennessee
Studied migratory behavior of marine finfish	Alabama
Determined the movements of king mackerel and spiny lobster	Florida
Assessed and monitored shrimp populations and movements	Alabama, Georgia, Louisiana, Mississippi, North Carolina, Texas
Continued to survey the recreational harvest of commercial fishes	Louisiana, Texas
Collected data on commercial finfish and shellfish landings	South Carolina, Texas
Tested various monoculture and polyculture techniques in marine finfish and shrimp	Alabama
Developed tecniques for the pond aquaculture of prawns (Macrobrachium sp.)	Florida
Began new project to develop an improved commercial strain of channel catfish	Mississippi
Evaluated methods to increase the abundance of oysters	Alabama, North Carolina
Planted shell for oyster culch	Florida
Surveyed oyster drill populations and installed bench marks to define oyster lease boundaries	Louisiana
Completed surveys of oyster and/or shell resources	Georgia, North Carolina, South Carolina
Continued fishery extension and marketing program	Florida
Tested gear to provide shrimp fishermen with a supplementary fishery in the off-season	Texas
Completed an evaluation of techniques for the use of skates and rays for food	North Carolina

Southwest Region

State/Federal Fishery Management Program

The Southwest Region, California Department of Fish and Game (CDF&G), and U.S. Coast Guard (USCG) entered into a cooperative agreement for fishery law enforcement activities in the waters off California. This agreement - the first of its kind - provides a basis for optimum deployment of State and Federal manpower and enforcement platforms. The agreement includes cross-deputization of State and Federal enforcement agents.

Implementation of the agreement is facilitated by a collocation of NMFS agents at CDF&G offices in San Diego and Eureka, Calif., and by cooperative development and implementation of procedures under the Enforcement Management and Information System (EMIS), which will be a piece of the overall data management system.

Federal Grant-in-Aid Program

Four projects continued in 1978 under the Anadromous Fish Conservation Act. These involved an ocean salmon study, research planning, Mad River fish hatchery operations, and operation and maintenance of fish screens and ladders.

Northwest Region

State/Federal Fishery Management Program

In 1978, SFFMP continued support for expanding the anadromous fishery data base, and upgrading and refining the Pacific States' ADP capabilities to better meet the needs of State, regional, and Council fishery management, through three contracts with the Pacific Marine Fisheries Commission (PMFC). The Commission completed coordinating, writing, and editing a series of reference documents on the freshwater aspects of salmon and salmon habitat management, alternatives for limited entry, and Pacific coast hatchery trends. These materials will provide crucial background information for the development of a comprehensive salmon management plan by the Pacific Fishery Management Council in 1980. Under the management of PMFC, the Regional Mark Processing Center upgraded the processing and publication of the Pacific States anadromous fish mark, tagging experiments, and recapture information. The 1976 Wire-tag and Fin-mark Sampling and Recovery Report was published and distributed, as were the Alaska Ocean Troll and the Columbia River Net and Oregon Troll Fisheries Reports. The development of a data retrieval system, capable of generating summary reports and accessible from on-line terminals, is a major contribution toward timely State, regional, and international fishery management. In 1978, PMFC initiated a regional effort to complete the Coastwide Data File, to further identify regional fishery information needs, and to assist NMFS in developing a Pacific coast data base for marine recreational fisheries.

Federal Grant-in-Aid Program

The Washington Department of Fisheries completed seven project under the Commercial Fisheries Research and Development Act (CFRDA). These involved resource inventories, aquaculture projects, and improvement of shellfish management. Six Washington Department of Fisheries' shellfish projects were begun in a variety of shellfish projects. The Idaho Department of Fish and Game (IDF&G) finished an evaluation of salmon and steelhead returns to the Salmon River and began a research project to evaluate the release of hatchery-reared smolts in the upper Salmon River watershed.

Under the Anadromous Fish Conservation Act (AFCA), Washington, Oregon, and the Pacific Marine Fisheries Commission, each completed a study on development of management information for the coho salmon fisheries. A Washington salmon hatchery on the Humptulips River, partially funded under the Act, was formally dedicated in July 1978, and three new projects to study salmon and ocean salmon fishery data collection were started in 1978.

Twelve AFCA and 13 CFRDA projects, 7 in the inland States, were continued in 1978. Inland State projects were directed at resource assessment and management of buffalo fish, catfish, trout, and white sucker resources. Other State projects addressed fish habitat, crab, clam, and groundfish assessment and data collection for more effective management of the commercial and sport salmon fisheries in the ocean, the territorial sea, and inland waters.

Alaska Region

State/Federal Fishery Management Program

Regional personnel continued to assist the Alaska Coastal Policy Council and Office of Coastal Zone Management (OCZM) in developing guidelines and standards for the Alaska Coastal Management Program (ACMP). They also assisted OCZM in reviewing and commenting on the discussion paper for ACMP and on proposed final CZM program development and approval regulations.

Federal Grant-in-Aid Program

The Region administered six Public Law 88-309 and eight Public Law 89-304 grants. The Alaska Department of Fish and Game received 13 of these grants; the Fisheries Research Institute, University of Washington, got 1. These grants were for management-oriented research on salmon and shellfish throughout Alaska.

Interstate Marine Fisheries Commissions

During 1978, the interstate Marine Fisheries Commissions continued to work actively with their constituent States and with NMFS toward effective fishery management. The Atlantic States Marine Fisheries Commission and the Gulf States Marine Fisheries Commission played a particularly important role in meeting their responsibilities to support the Regional Fishery Management Councils. In addition, the Commissions continued to provide valuable coordination for the NMFS State/Federal Fishery Management Program.

Columbia River Project

A variety of cooperative research studies were made by the Northwest and Alaska Fisheries Center with the U.S. Army Corps of Engineers; U.S. Fish and Wildlife Service; Pacific Northwest Regional Commission; Bonneville Power Administration; and Chelan, Douglas, and Grant County Public Utility Districts of Washington State to sustain and improve runs of Pacific salmon and steelhead trout in the Columbia and Snake Rivers. In these studies, NMFS provided the scientific and technical expertise and the cooperating agencies provided the bulk of the research funds.

Research on collecting juvenile salmonids at upriver dams, transporting them by truck or barge around hazardous areas, and releasing them back into the Columbia River near the estuary progressed to the stage where the transportation of smolts can function as a routine operational program to help salmonids migrate down the Snake River. Research was begun to adapt and improve the techniques learned in the Snake River for use in the mid-Columbia River.

Successful monitoring of passage of nontransported juvenile salmon migrants as they progress downriver made it possible to save valuable potential electrical energy by reducing the amount of water spilled at dams during fish passage.

Columbia River Fishery Development Program - The 1978 spring chinook salmon run past Bonneville Dam was 120,000, about the same as in 1977. The 1978 summer chinook salmon run had an estimated 44,300 fish, which was slightly over the previous 4-year average. The summer steelhead run continued to decline; an estimated 105,000 fish passed Bonneville. The total upriver 1978 fall chinook run continued to decline; the Snake River segment reached a near-record low of 1,600 fish. Extreme concern for the upriver stocks of salmon and steelhead caused NMFS and FWS to begin a review of their status to determine whether any species should be proposed as threatened or endangered under the Endangered Species Act.

Waste treatment facilities for a number of hatcheries were constructed with funds from the Department of Commerce Economic Development Administration, supplemented by the Columbia River Fishery Development Program (CRFDP) monies. Washington Department of Fisheries hatcheries at Elokomin, Grays River, Klickitat, Toutle, and Washougal now have operable systems. Construction of facilities at Abernathy and Oxbow hatcheries started during the year, and the design for the Sandy hatchery was completed.

In cooperation with the U.S. Forest Service, four new rotary fish screens were constructed at irrigation diversions on the upper Salmon River near Stanley, Idaho. This project was difficult, because of the need to conform to rigid standards, such as underground wiring and maintaining a rustic appearance in the Sawtooth National Recreational Area.

Routine inspections of fishways revealed no major problems. The new No. 4 entrance at the Willamette Falls ladder installed in 1977 is working satisfactorily. The ladder was in heavy use with counts of 45,000 spring chinook, 17,437 fall chinook, 15,200 summer steelhead, 13,600 winter steelhead, and 1,711 coho. The summer steelhead passage was more than double any previous count.

The Operational Improvement Investigations included studies on 15 projects. Coastwide hatchery release data, fishery contributions, hatchery biology, and economic evaluation were the main tasks.

Activities of the Fish Facilities Branch during 1978 included continued extensive involvement in design review and inspection of fish passage facilities for two new powerhouses under construction at Bonneville and Rock Island Dams on the Columbia River. Construction of the facilities at Rock Island Dam was completed, and the facilities appear to be operating satisfactorily.

The branch also helped plan and develop design for fish screens at numerous irrigation, industrial, and thermal powerplant water diversions of all sizes in the Columbia River Basin and nationwide. Two large projects requiring screens are the proposed Peripheral Canal in California and the McClusky Canal in North Dakota. The branch also provided extensive assistance in establishing design criteria and developing plans for fish ladders or downstream migrant facilities involving new construction or modification at seven existing dams and three proposed dams.

The major activity of CRFDP involves the operation of 22 salmon and steelhead hatcheries. In 1978, these 22 production facilities produced and released the following:

Table 10.--1978 Columbia River Fishery Development Program Hatchery Production Activities

	Numbers of fish	Pounds of fish
Chinook	100,100,000	1,500,000
Coho	26,300,000	1,400,000
Steelhead	2,200,000	200,000
Total	128,600,000	3,100,000

Figure 13

"Fish Flow" and "Fish Haul 77", cooperative programs by NMFS and the Corps of Engineers, helped young fish bypass dams on the Snake and Columbia Rivers, such as the Lower Granite Dam (fig. 14).

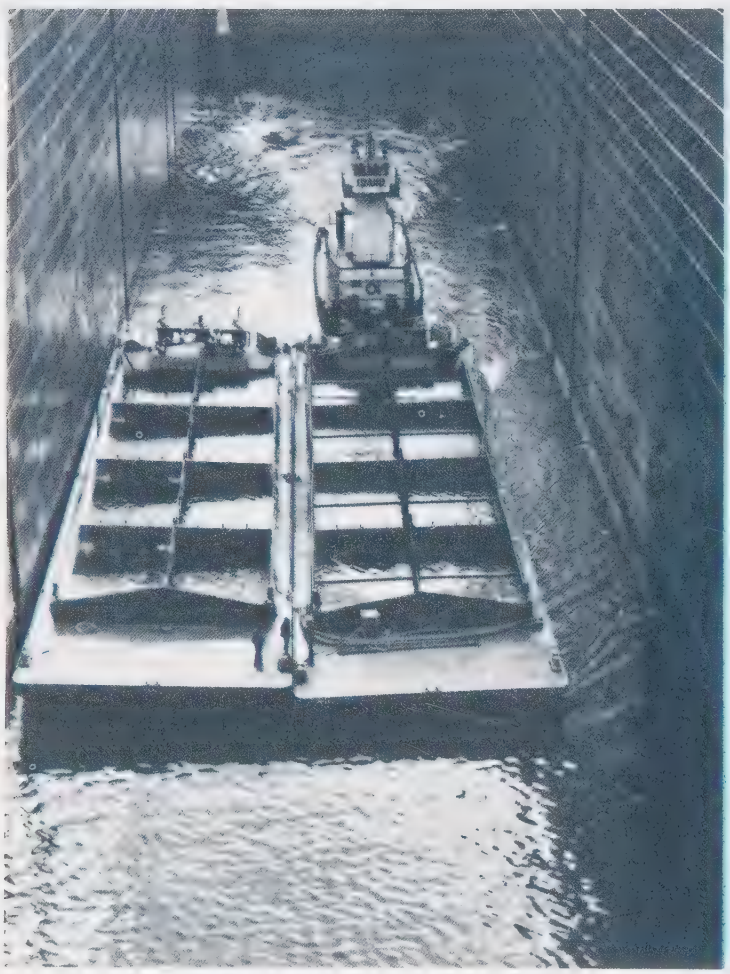
Figure 14

NMFS staffers load young fish onto truck for trip downstream (fig. 15) bypassing power turbines and low water on the Columbia River.

Figure 15

Chinook salmon
(fig. 16)

Figure 16



Specially designed barge moves young salmon through Snake River lock (fig. 17).

Figure 17

INTERNATIONAL ASPECTS OF FISHERIES

The International Fisheries Affairs Office of NMFS coordinates the Agency's participation in international activities concerning living marine resources of interest to the United States. In conjunction with the Department of State, the Office conducts negotiations with various foreign governments on fishery matters of concern to the United States.

NMFS also coordinates the activities for two Regional Fisheries Attaches, one in Tokyo, Japan, and one in Mexico City, Mexico. The attaches follow major developments in world fisheries as they affect U.S. Government policies and programs, as well as the U.S. fishing industry.

The United States is party to seven international fishery commissions, and NMFS provides support for the U.S. Commissioners to these commissions.

NMFS also provides support for bilateral fishery claims boards and is responsible for a translation program for NOAA areas of responsibility.

International Fisheries Claims Boards

During the year the U.S.-U.S.S.R. Claims Board considered four claims, including one that was outstanding at the end of 1977, two that were reconsidered, and one new claim that was submitted during 1978. Two claims were considered with the Board sitting in arbitration. Recommendations favorable to the claimants were made in three claims in the amount of $49,499.95.

The United States-Polish Claims Board did not meet during 1978. No new claims were filed during the year, and none was outstanding from prior years.

The United States-Spanish Fisheries Board was established during 1978. One claim was filed with the Board, and this claim was under active consideration at the end of 1978.

International Organizations and Negotiations

The extension by the United States of its fishery jurisdiction to 200 miles on March 1, 1977, and the implementation by many countries of a 200-mile fishery zone led to substantial efforts in 1978 to negotiate or renegotiate international fishery agreements affecting U.S. interests. The expansion of fishery jurisdiction has also required significant changes in the traditional fishing activities of vessels fishing off the coasts of other countries, and frequent interaction between U.S. and foreign officials to facilitate such changes.

Enactment of FCMA, extending fishery jurisdiction of the United States, established important new responsibilities and directions in international negotiations. FCMA provides for the negotiation of governing international fishery agreements (GIFA's) under which those nations desiring to be eligible for opportunities to fish for resources under the exclusive fishery management authority of the United States acknowledge such exclusive U.S. fishery management authority as set forth in the Act.

The United States concluded no new GIFA's in 1978, although Denmark (on behalf of the Faroe Islands), Portugal, and Venezuela expressed interest in undertaking such agreements. Previous GIFA's include those negotiated with Bulgaria, Cuba, European Economic Community, German Democratic Republic (East Germany), Japan, Republic of Korea, Mexico, Poland, Romania, Spain, Taiwan, and the U.S.S.R.

International North Pacific Fisheries Commission (INPFC). On April 6, 1978, Canada, Japan, and the United States reached agreement on a Protocol to the International Convention for the High Seas Fisheries of the North Pacific Ocean. The previous convention had restricted Japanese salmon fishing since 1953 to waters west of longitude 175°W. in the North Pacific Ocean and Bering Sea in order to minimize interceptions of salmon of North American origin. The 1978 Protocol significantly expanded the protection afforded North American salmon by imposing additional restrictions on time and area. The Protocol also set in motion a comprehensive United States-Japan cooperative research program in the Convention area on marine mammals, particularly Dall porpoise. This program was developed in response to United States concern regarding the incidental take of Dall porpoise in Japanese salmon gillnets. Japan's high-seas salmon fishery in the Convention area operated under the terms of the Protocol in 1978.

Conventions for the Establishment of the Inter-American Tropical Tuna Commission (IATTC). During 1978, meetings were held in Costa Rica, Mexico, and the United States to continue negotiations begun in 1977 to develop a new tuna conservation and management convention to replace IATTC. These negotiations to revise the current IATTC were initiated by Costa Rica and Mexico, which claim a 200-mile exclusive economic zone and fishery management jurisdiction over highly migratory tunas. Considerable progress was made in reducing the areas of disagreement between the United States, which does not recognize coastal state claims over highly migratory tunas, and the Latin coastal states. However, the fundamental issue in the negotiations remains to be resolved, that of coastal state guaranteed allocations of yellowfin tuna.

At their annual meeting held in October, IATTC members failed to agree on the regulatory program for the 1979 fishing season and recessed for an indefinite period pending the outcome of the negotiations to establish a new management organization. Mexico's withdrawal from IATTC became effective on November 8, 1978, and Costa Rica reaffirmed its intention to withdraw as of April 27, 1979.

United States-Canada Maritime Boundary and Fishery Resources Negotiations. Canada and the United

States continued their efforts in 1978 to conclude mutually acceptable agreements on the delimitation of maritime boundaries and management, shares, and access arrangements regarding fishery resources of concern to both countries.

Chief negotiators were able to conclude 1978 arrangements on the continuation of reciprocal fishing pending agreement for the longer term. However, Canada chose in late May not to implement the interim agreement, which essentially would have continued in 1978 a similar 1977 agreement. Canada cited the lack of sufficient progress in negotiations for the long-term. The chief negotiators subsequently renewed their efforts on these long-term arrangements.

In late November 1978, the United States Secretary of State and the Canadian Secretary of State for External Affairs met to discuss outstanding issues. As the result of that meeting, chief negotiators were called upon to resolve remaining differences by the end of the year and it was agreed that issues not resolved should be submitted to the Secretaries for determination. Conclusion of a comprehensive Atlantic fisheries agreement, an agreement to submit the delimitation of the Gulf of Maine boundary to third party arbitration, a West Coast agreement dealing with United States access to groundfish off Canada, and the continuation of the convention establishing the International Pacific Halibut Commission (IPHC) are anticipated in 1979.

International Pacific Salmon Fisheries Commission (IPSFC). During 1978, Canada and the United States continued negotiations on a Pacific salmon agreement intended to deal with the fishermen of one country catching salmon that originate in the other country. The negotiators focused on the development of a convention that would include (1) principles for managing and limiting interceptions of Pacific salmon, and (2) an institutional structure for monitoring interceptions under an agreed limitation scheme and for facilitating cooperation in management and research. The two sides made progress in refining a discussion draft agreement. It is expected that the new convention will assume, in part, the functions of the United States-Canada International Pacific Salmon Fisheries Commission (IPSFC) established under the 1937 United States-Canada Convention for the Preservation and Extension of the Sockeye Salmon Fishery of the Fraser River System, and the 1956 Pink Salmon Protocol.

Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. The Government of Canada convened an informal meeting of experts in May 1978 to resolve outstanding issues related to the draft convention. As the result of that meeting, final agreement was reached on the text of the convention, which Canada opened for signature on October 23, 1978, and which entered into force on January 1, 1979. U.S. adherence is anticipated.

The convention replaces the International Convention for the Northwest Atlantic Fisheries (ICNAF) and establishes the Northwest Atlantic Fisheries Organization (NAFO). NAFO is responsible for continuing multilateral scientific research and investigation of Northwest Atlantic fish stocks, and for managing and allocating catches that occur beyond national fishery limits. In the case of overlapping stocks, NAFO will ensure consistency between management measures taken beyond national fishery limits by the contracting parties and those taken within such limits by the appropriate coastal state. During 1979, ICNAF will remain in force until the contracting parties have completed the transition to NAFO. The United States withdrew from ICNAF on December 31, 1976.

International Whaling Commission (IWC). At its 30th meeting in June 1978 and its special meeting in December 1978, IWC continued to establish catch limits for commercial whaling based on recommendations of the Scientific Committee. The result of both meetings was a reduction of 3,994 whales from the total allowable catch of the previous year.

The Scientific Committee recommended that the remaining two hunted stocks of sei whales in the Southern Hemisphere be protected. As a result, all commercial whaling for this species in the Southern Hemisphere is prohibited.

IWC reduced the allowable catch of sperm whales in the North Pacific by more than 40 percent. A quota of 3,800 males was established; this figure is to include a bycatch of females of up to 11.5 percent (437). When 3,800 animals or 437 females (whichever occurs first) have been taken, all hunting for sperm whales in this area must cease. Elsewhere, commercial whaling for sperm whales near western Australia was prohibited.

The 1978 regulations on bowhead whaling by Alaska Eskimos were revised largely because of an intensive U.S. research program that revised the bowhead population estimate to 2,264, more than double the previous figure. The Commission agreed that, in 1979, Alaska Eskimos may land 18 of strike a total of 27 bowhead whales (whichever occurs first) as long as no calves or females with calves are taken.

At the June 1978 meeting, Chile, Republic of Korea, Peru, and Spain announced intentions to join IWC before the 1979 annual meeting. The Republic of Korea became a member on December 29, 1978, and Chile and Peru have taken significant legislative steps toward membership. Should all four countries become members, whaling by nonmembers would be reduced to less than 10 percent of all known whaling. IWC also passed a resolution encouraging nonmember whaling nations to become members. Other resolutions stated that IWC member nations should (1) prevent transfer of vessels or gear to nonmember nations, (2) discourage dissemination by their citizens of expertise and assistance necessary to conduct whaling to nonmember nations, and (3) prevent import of whale products from nonmember whaling to nonmember whaling nations. A preparatory meeting for a conference of plenipotentiaries to negotiate a new convention on cetacean conservation was held in Copenhagen, Denmark, July 4-8, 1978. Discussion of

existing and new proposals continued, and the problem of coordinating the need for cetacean conservation with coastal states rights was aired. A working group was formed to review and edit the draft text, which includes all current proposals. Portugal offered to host the working group late in 1979.

Bilateral Fishery Consultations. The United States held consultations with a number of countries in 1978 in support of U.S. distant-water fishing interests. On behalf of vessels operating in the Brazil-Guianas shrimp fishery, United States officials met with a Brazilian delegation in February 1978 to consider arrangements under which the traditional United States shrimp fishery might continue in the waters off Brazil. No agreement between governments was reached primarily, because Brazil insisted that joint venture arrangements replace bilateral agreements allowing foreign flag vessels access to Brazilian shrimp grounds.

Consultations during the year with European Economic Community (EEC) officials on behalf of United States shrimp vessels operating in the waters off French Guiana were successful, and United States vessels fished during 1978 off French Guiana under licensing arrangements that limit catch and fishing days, but require no fee. Officials from the United States and Mexico met in June in Washington, D.C., to review the application and implementation of United States-Mexico Fisheries Agreement. Under terms of the agreement, which was implemented in 1976, U.S. vessels have fished in Mexican Gulf water for grouper, shrimp, and snapper, and for tuna and market species in the Pacific.

The United States and the Soviet Union also exchanged views on an agreement that could provide for access by United States nationals and vessels to fishery resources off the Soviet coast. Further discussions of such an agreement modeled after the U.S.-U.S.S.R. GIFA are expected during 1979.

Throughout 1978, consultations with respect to foreign fisheries within the United States FCZ were held with representatives of the Governments of Cuba, Japan, Poland, Spain, and the U.S.S.R. Additional informal discussions with foreign governments and industry representatives took place during 1978 on a continual basis. These consultations and discussions, together with written comments received during the public comment periods on specific regulations provided for in NOAA/NMFS rulemaking procedures have served to focus attention on areas of concern to foreign governments. The consultations, discussions, and written comments provided a useful basis for ameliorating problems which arise for foreign fleets under U.S. regulations, to the extent these problems can be resolved in a manner consistent with U.S. fishery conservation and management goals.

Organization for Economic Cooperation and Development (OECD). The United States participated in the 41st and 42nd Sessions of the OECD Committee for Fisheries. The Committee for Fisheries prepares an annual review of fisheries for each member country. It is also preparing reports on financial support to the fishing industries, and on the impact of revision in fishery jurisdiction on international trade.

Food and Agricultural Organization of the United Nations (FAO). The Food and Agricultural Organization of the United Nations maintains many fishery programs designed to help contribute to the solution of world food problems. NMFS participated in the FAO Committee on Fisheries (COFI), a multiState policy body that guides the work of the FAO Department of Fisheries, as well as regional fishery commissions established under the auspices of FAO.

The 12th Session of COFI was held in Rome, Italy, during June 12-16, 1978, and was attended by 74 member countries and numerous observers from international and nongovernmental organizations. The major items discussed were (1) the program for development of fisheries in economic zones of developing countries, (2) decentralization of FAO regional fishery bodies, (3) future organization and work of COFI, and (4) the living resources of the southern oceans around Antarctica.

A special subcommittee of COFI was established to help develop, implement, and review the FAO program for development of fisheries in economic zones of developing countries. This program will likely become the primary mission of the FAO Department of Fisheries in the next several years, because most members of COFI indicated that it should be given a high priority.

Convention for the Conservation of Antarctic Seals. The Convention, which entered into force on March 11, 1978, calls for the coordinated management of Antarctic seals and the exchange of scientific information. Belgium, France, Norway, South Africa, United Kingdom, United States, and U.S.S.R. are parties to the Convention. Argentina, Australia, Chile, Japan, and New Zealand have signed, but not ratified the convention.

Antarctic Marine Living Resources. Extensive negotiations among the consultative parties to the Antarctic Treaty were held in 1978 to create a new convention for conservation of the marine living resources of Antarctica. The new regime is designed to protect marine living resources, including birds. It would not apply to whales and seals, which are the subject of existing international agreements, but coordination with the whaling and sealing authorities is contemplated.

The new regime will be based upon ecosystem management south of the Antarctic Convergence, the circumpolar zone of transition where cold Antarctic waters and warmer waters to the north converge.

Two special consultative negotiating sessions were held in 1978, the first during February and March at Canberra, Australia, and the second in July at Buenos Aires, Argentina. In addition, an informal negotiating session was held in September in Washington, D.C.

Coordination with the Agency for International Development (AID). NMFS provides three fisheries

scientists to AID through a Resource Service Support Agreement to act as advisers to AID in fishery matters and to provide the technical expertise of the AID Fisheries Division. This advisory expertise is divided about equally into (1) support to AID's regional bureaus and country missions in addressing the technical aspects of fishery projects or activities and (2) administering AID-funded research and other related activities of broader scope than country projects.

NMFS administered five AID-funded research and related projects. The Oceanic Institute in Hawaii is doing research on the artificial propagation of milkfish. The International Center for Aquaculture (Auburn University) and the International Center for Marine Resources Development (University of Rhode Island) were provided funds (as they have been for a number of years) to develop and have expertise that is available to country missions and host countries. A contract was entered into with Resources Development Associates, Inc., in California to make a planning study on Collaborative Research Capabilities of U.S. Academic Institutions and needs of the developing countries. The fifth project provided a small project grant to the Southeast Asian Fisheries Development Center, headquartered in Bangkok, Thailand, to arrange an International Management Study Group to make an in-depth study of the structure and functions of the center, its Secretariat, and the three departments with a view to strengthening the center. Extensive travel in the United States and overseas, as well as a high level of Washington, D.C., office staff work was required to support these five projects in planning, project design, contract/grant negotiations, and evaluation.

Foreign Training

The Foreign Training Program is responsible for the planning, managing, and monitoring of professional academic and technical training programs in oceanography and fishery science for trainees from foreign countries. Trainees are referred to NOAA by the AID, the United Nations, specialized agencies of the United Nations, and the Military Assistance Program. Some of the training programs are arranged by bilateral agreements.

During 1978 the program specialist supervised the training and visits of 43 participants from 25 countries in various disciplines.

NMFS, in cooperation with Auburn University, Auburn, Ala., implemented a special training course entitled "Aquaculture Training" for 15 participants from six developing countries.

In addition to the AID and United Nations trainees, NMFS arranged programs for several high-level policymaking officials from the Cayman Islands, Iceland, Indonesia, Japan, and Western Samoa.

Translation Service

NMFS serves NOAA in all translation and language services activities. Translations are produced inhouse, by contract with U.S. experts, or overseas using Public Law 83-480 Special Foreign Currencies. Notable translations produced in 1978 included: "Cestoda: Linguidae, Fauna of the U.S.S.R." by M.N. Dubinina (in print); "Production of Meal, Oil and Protein - Vitamin Preparations in the Fishing Industry" by P.I. Kulikov; "Methods for the Diagnosis of Fish Disease" by Zdanek Luckey; "Metabolism and Biochemistry of Fishes" compiled by G.S. Karzinkin.

Releases were published at frequent intervals to inform users of new foreign literature and current translations. These are: (1) "Received or Planned Current Foreign Fisheries, Oceanographic, and Atmospheric Translations"; (2) "Translated Table of Contents of Current Foreign Fisheries, Oceanographic, and Atmospheric Publications"; (3) "Survey of Foreign Fisheries, Oceanographic, and Atmospheric Publications"; and (4) "Daily News" releases.

NMFS serves the Joint Subcommittee on Aquaculture (JSA) of the President's Office of Science and Technology Policy by arranging for translation of important literature in the field of aquaculture. Under this program, over 70 works on aquaculture were translated in 1978, using funds contributed by six agencies having membership on the JSA.

Extensive exchanges of translations and publications are maintained with leading national and foreign institutions. A large number of translations were distributed during 1978 to government, industry, international organizations, and academic circles.

Export Expansion

NMFS established a program to help increase export sales, especially of seafood products that became more available to U.S. industry as a result of the implementation of FCMA.

A program was developed to assist U.S. producers and exporters to increase sales in foreign markets. This includes planning and holding export market seminars, foreign trade fairs, trade missions, and related activities.

NMFS participated in Secretary Kreps' United States export development mission to Japan, the largest export mission ever undertaken by the United States. During the mission an agreement was reached to increase opportunities for fishery exports to Japan. The agreement was signed later in Washington, D.C.

Analysis of Trends in World Fisheries

The analysis of political and economic trends in world fisheries, always an important NMFS activity, is becoming more so, because of the recent extension of U.S. fishery jurisdiction and large U.S deficits in fishery trade. Foreign fisheries are studied in depth to provide background for negotiations with foreign countries and to regulate foreign fishing in the U.S. 200-mile fishery conservation zone. Foreign developments must also be studied to determine their possible impact on the U.S. fishing industry and U.S. Government policies and programs.

Current information on major developments in world fisheries was collected and evaluated, and NMFS received and used data prepared by over 240 U.S. diplomatic posts and four Regional Fishery Attaches.[1/] More than 5,000 cables, dealing with fisheries and related subjects, were received, processed, and analyzed during 1978. In addition, NMFS and foreign fishery ministries and agencies exchanged over 900 publications, many in with the foreign languages, Foreign Fisheries Analysis Staff.

Developments in world fisheries were followed closely when they could or did affect the fortunes of the U.S. domestic industry or the policies of the U.S. Government. A total of 211 reports on foreign fisheries describing economic, marketing, technological, and political trends were prepared.

Detailed surveys on the fisheries of Gambia, Ghana, Kenya, Senegal, and Tunisia were published and disseminated. A definitive study of the Brazilian lobster industry and the Faeroe Islands fisheries were prepared and published. Reports submitted by the U.S. Regional Fisheries Attache in Tokyo on the status of the fisheries in Hokkaido, Kyushu, Malaysia, Singapore, and Taiwan were edited and distributed to the United States industry end-users.

Fishery reporting requirements of the Department of State were revised, and appraisals prepared of cables received from U.S. diplomatic posts. Briefings were arranged for about 100 foreign service officers going to new assignments.

Particular attention was paid to Canadian fisheries, and reports describing Canadian Atlantic and Pacific coast fisheries, the scallop resources, etc., were prepared. Sensitive issues in Canadian fisheries received special emphasis, and a report was prepared on Canada's Atlantic seal hunt. The subsidies to the fishing industry were analyzed in a detailed study, highlighting the question of countervailing duties against Canadian fishery exports to the United States.

Foreign Marketing Services

During 1978, the U.S. fishing industry greatly increased its demand for information on fishery markets abroad. The number of letters seeking information on foreign fisheries doubled during the last 3 years. Priority was given to those U.S. companies and individuals who sought to take advantage of the opportunities created by the new U.S. 200-mile FCZ and the extended fishery jurisdictions of other countries. The U.S. fishing industry's hope to harvest the underused species of fish and shellfish in U.S. waters is closely connected to the expectation that continued, comprehensive, and thorough analysis of trends in foreign fisheries will highlight opportunities not only for increased exports of edible fishery products, but also opportunities for U.S. investments and/or sales of U.S.-made fishing vessels, gear, and processing equipment.

A total of 189 current fishery export opportunities (FEO's) were disseminated to the industry. The program, started in 1977 (when only 40 FEO's were published), was given increased emphasis in 1978 as the U.S. fishery exporters became more active and more numerous.

Similarly, the preparation and dissemination of foreign fishery trade and investment opportunities was greatly expanded (from 20 in 1977 to 52 in 1978). NMFS now distributes information on foreign opportunities to U.S. companies involved in aquaculture, consulting services, vessel construction, and the manufacture of fishing gear and equipment.

Detailed files were maintained on foreign fishery markets and fishing industries, and the information was used to prepare almost 700 replies sent to U.S. companies requesting specific marketing assistance. An even greater number of telephone queries was serviced, and the information from these files was made available to Federal and State Government agencies, industry, and the academic community.

A study of the fishing industry in 28 Latin American countries was disseminated to the U.S. industry. About 30 similar lists for African countries were prepared and will be combined into one single report to be published in 1979. These lists include details on foreign fishery agencies, trade journals, fishery associations, fishing companies, commercial representatives, seafood detentions, and available foreign fishery reports. The lists will be useful to existing and potential U.S. exporters of fishery products, gear, and equipment in studying foreign fishery markets for possible export sales.

Data on detentions of seafood imports by the U.S. Custom's Service were collected. In the past, U.S. companies have indicated that these data were useful in their commercial dealings with foreign countries.

A list of all key Latin American fishery officials and agencies was prepared. Similar lists for Western European and African countries were prepared in 1977. Data for the Middle East and Asian countries were collected for later publication.

[1/] The U.S. Department of State abolished two Regional Fishery Attache posts (in Copenhagen and Casablanca) in October 1978.

MARINE MAMMALS

Passage of the Marine Mammal Protection Act of 1972 (MMPA) committed this Nation to continuing long-term management and research programs to conserve and protect marine mammals. MMPA imposed a moratorium on taking and importing marine mammals or their products, with exceptions, in the United States. The Act applies also to persons subject to U.S. jurisdiction on the high seas. In 1976, FCMA expanded U.S. control over marine mammals to include the 200-mile FCZ.

NMFS is responsible under MMPA for all porpoises, seals, sea lions, and whales. The Act allows exceptions and waivers of the moratorium on taking and importing. Alaska natives may take marine mammals for subsistence, and the Act may be waived to allow management of marine mammals to be returned to individual States. Permits may be issued for scientific research and public display and incidental catch of marine mammals.

Currently, NMFS makes decisions on requests for waiving the moratorium, issues permits, carries out research programs, enforces provisions of the Act, publishes rules and regulations to manage marine mammals, cooperates with the States, participates in international activities and agreements, and maintains a close working relationship with the Marine Mammal Commission and its Committee of Scientific Advisors.

An annual report on the administration of the Marine Mammal Protection Act is available from the Washington, D.C., office.

Incidental Take of Porpoise

An encouraging development during 1978 was the progress made in the reduction of porpoise mortality incidental to tuna fishing. In 6 years, the number of porpoise killed in association with purse seine fishing for yellowfin tuna has dropped almost 95 percent from an estimated mortality of over 300,000 in 1972. As part of a 3-year management program, NMFS set quotas on the number of porpoises that could be taken in 1978, 1979, and 1980. During 1978, the estimated porpoise mortality by U.S. fishermen was less than 15,000 animals, compared with 27,000 in 1977. The allowed quota for 1978 was 51,945. (See table 11 for statistics on porpoise mortality.)

Table 11.--Porpoise mortality associated with purse seine fishing for yellowfin tuna

	Allowed quota	Annual estimate
1976	78,000	104,000
1977	62,429	27,000
1978	51,945	15,000
1979	41,610	--
1980	31,150	--

MMPA requires commercial fishermen to have a permit if taking marine mammals along with their intended catch cannot be avoided. After the 1-year permits for tuna purse seine fishing expired, a new 3-year permit was issued to the American Tunaboat Association beginning January 1, 1978. In addition to the annual porpoise quotas, the 3-year permit added new regulations that apply to tuna purse seine vessels.

The new regulations required large U.S. tuna purse seine vessels to install a porpoise apron in their existing fine-mesh porpoise release panels before they could receive a 1979 certificate to fish on tuna. Throughout the year, NMFS technicians supervised the manufacture and installation of the required apron in the nets of both U.S. and foreign tuna purse seiners. The porpoise (or super) apron (fig. 19) is a triangular section of fine-mesh webbing that is placed on top of another fine-mesh panel. The combination of the panel and apron acts as a chute and has been successful in allowing the porpoise to escape the tuna nets. The regulations also required the use of specific release procedures on each set involving porpoise, established a quota on the number in each individual porpoise stock that may be killed by the U.S. fleet during purse seining operations, and required other procedures designed to reduce porpoise mortality. The cumulative mortality of porpoises is closely monitored, and continual analysis is made of the kill rate by the U.S. fleet. A procedure has been developed to estimate cumulative kill by stock on a weekly basis. The regulations require an observer onboard each certified U.S. vessel for at least one trip per year from 1978 to 1980. Observers from the Southwest Region made 113 trips aboard tuna vessels in 1978 to record porpoise mortality and the performance of the required porpoise release gear and procedures. This represented 41 percent of the total trips by U.S. tuna purse seiners in the Eastern Tropical Pacific Ocean.

Importation embargos on yellowfin tuna have been relaxed for countries that have purse seine vessels operating under their flag in the Eastern Tropical Pacific (ETP) with the exception of Peru. Each certified country must show proof of installing new porpoise release gear aboard their flag seiners to avoid reimposition of the embargo. NMFS will monitor closely the degree of commitment shown by each country to reduce porpoise mortality by their purse seine fleets.

Through an agreement between NMFS, the Marine Mammal Commission, and the U.S. Tuna Foundation, the tuna industry dedicated the purse seine vessel, the QUEEN MARY, for use as a research ship to study the behavior of porpoises and the effectiveness of porpoise release gear in 1978. The Southwest Fisheries Center and the Southwest Region are responsible for porpoise research and management programs that relate to the tuna fishery.

During two 50-day cruises aboard the dedicated vessel, methods to capture, hold, handle, and tag large groups of porpoise in their natural environment were evaluated as were the effects of tags and marks on the animals. Use of the dedicated vessel made it possible to observe for the first time the overall performance

Figure 18.--A scientist helps tuna fishermen install the new "super apron" in the tuna seine.

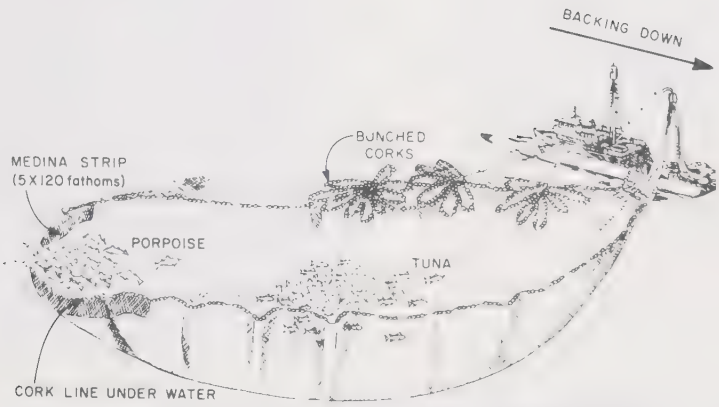


Figure 19.--Tuna boat equipped with "super apron."

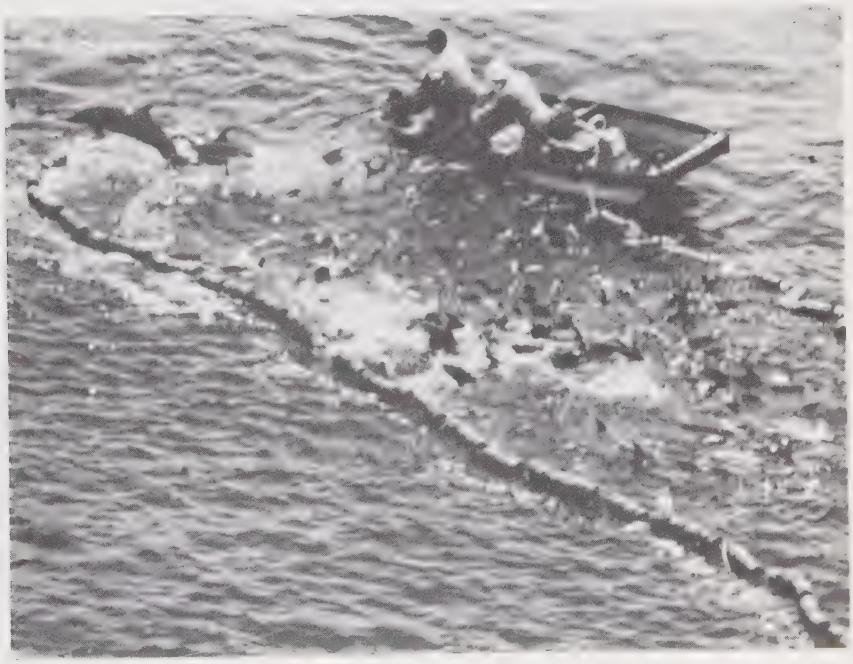


Figure 20.--Fishermen helping porpoise escape from the net during breakdown.

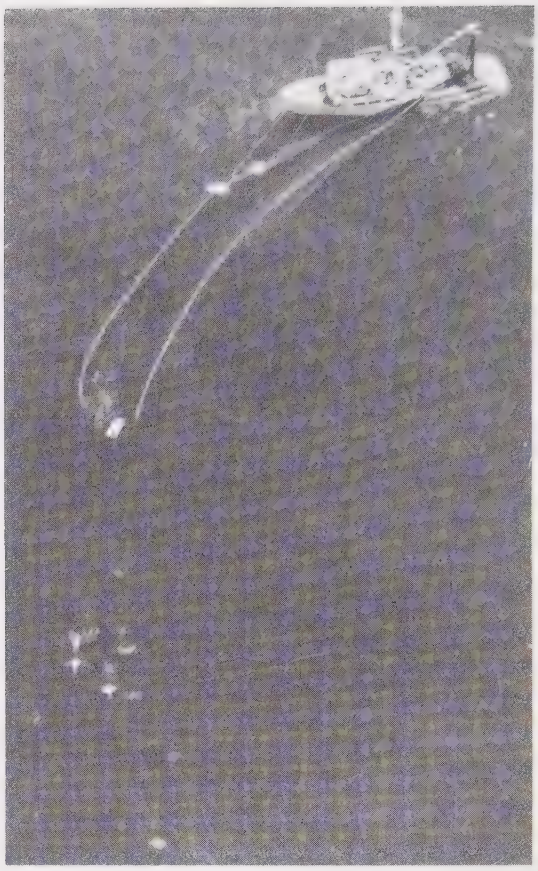


Figure 21.--A tuna boat in the final stages of backdown with porpoises escaping over the end of the net at low left side of the boat.

Figure 22.--A purse seine net "backing down" under a school of porpoise.

of net dynamics, especially the backdown procedure. SCUBA divers entered the net during three of the five cruises and were able to determine the cause of a backdown characteristic known as "stern sway," a major contributor to porpoise mortality. The information gained during these studies is essential to the development of techniques and gear to take full advantage of the backdown procedure.

A thorough engineering assessment of the entire purse seine operation was started during the dedicated vessel cruises. The assesment may lead to improvements that will reduce porpoise mortality further. The data that were collected through surface and underwater measurements will allow testing and verification of existing theories describing fishing gear behavior. NMFS gear specialists are working with a contractor to develop a computer simulation of the purse seining process that can be used to study a wide range of fishing gear techniques at low cost.

Marine Mammals - Commercial Fisheries

MMPA called for a general permit system to allow unavoidable takings of marine mammals in commercial fishing gear and to allow fishermen to protect their gear and catch from depredation caused by direct conflict with marine mammals. General permits are applied for by fishing associations or individuals representing large blocks of fishermen (e.g., salmon trollers and anchovy seiners). The general permit applications are reviewed in a process similar to that for research and public display permits. Once a general permit is issued, individual fishermen can apply for Certificates of Inclusion, which allow a taking of marine mammals under the provisions of the general permit. General permits have been issued to domestic fishermen since 1974.

In 1978, three general permits were issued to domestic fishing associations and five to foreign countries (Japan - 3, Bulgaria -1, Russia - 1).

The Fishery Conservation and Management Act expanded the MMPA to include the U.S. 200-mile fishery conservation zone and required foreign fishermen to obtain general permits for incidental take of marine mammals. The increased number of marine mammals requested to be taken under general permit fishing operations within U.S. jurisdiction emphasized the need for a review of the general permit system.

NMFS sponsored a workshop to update information on marine mammals involved in commercial fishing operations within the U.S. FCZ. A report from the workshop will be used as a basis for issuing permits and possible modifications to the permit system.

FCMA also requires management plans for each fishery in the FCZ. Each plan must assess the effect of proposed fishing on the entire marine environment. Plans are reviewed to ensure that marine mammal interests are considered.

Dall Porpoise

1978 was the first year of a 3-year cooperative research program between scientists from the Japanese Fisheries Agency and the NMFS Northwest and Alaska Fisheries Center to study the incidental take of marine mammals, especially the Dall porpoise, by the Japanese high-seas salmon gillnet fishery in the North Pacific. United States and Japanese scientists were aboard Japanese motherships to estimate rates of natural mortality and recruitment, and total incidental take, and determine the identity of Dall porpoise stocks on the fishing grounds. During the 3-year program, scientists are making sighting surveys annually aboard Japanese salmon research vessels to estimate how incidental mortality affects the Dall porpoise population. Past incidental catch and salmon fisheries data are being analyzed to develop a historical record of the numbers of porpoise taken. The acoustic characteristics of gillnets and of the Dall porpoise are being examined to see if incidental mortality can be reduced by modifying fishing gear. The research program is a result of a Memorandum of Understanding agreed to by Japan and the United States as members of the International North Pacific Fisheries Commission (INPFC).

Bowhead Whale

Before 1977, the International Whaling Commission (IWC) did not regulate the native subsistence harvest of bowhead whales, although all other taking of bowheads was prohibited. In 1977, in response to growing concern for the bowhead whale, IWC removed that exemption and established a 1978 quota of 12 landed or 18 struck (whichever occurred first). In the previous year, the take of bowhead whales by Alaska Eskimos had been 26 landed and 82 additional whales struck and lost. In June 1978, IWC added 2 landed and 2 struck to the original quota, bringing the total to 14 landed and 20 struck for the year. IWC counts each whale landed as a strike.

The United States, responding to the IWC action, cooperated with Alaska Eskimos and other interested groups and established programs of research, management, and weapons improvement. The results were published in "A Special Report to the International Whaling Commission: Bowhead Whales (U.S. Department of Commerce, NOAA, June 1978)," which is available from the Washington, D.C., office.

Based on observations made in spring 1978, the report concluded that the population of the stock of bowhead whales migrating past Alaska Eskimo whaling villages (see fig. 24) ranges from 1,783 to 2,865 whales, with 2,264 bowheads considered the best estimate. To establish the 1978 quota, IWC had used a previous estimate of about 1,300 whales.

The results of the spring hunt were 10 whales landed and 5 struck, but lost, for a total of 15 whales struck.

Figure 23.--Bowhead whale.

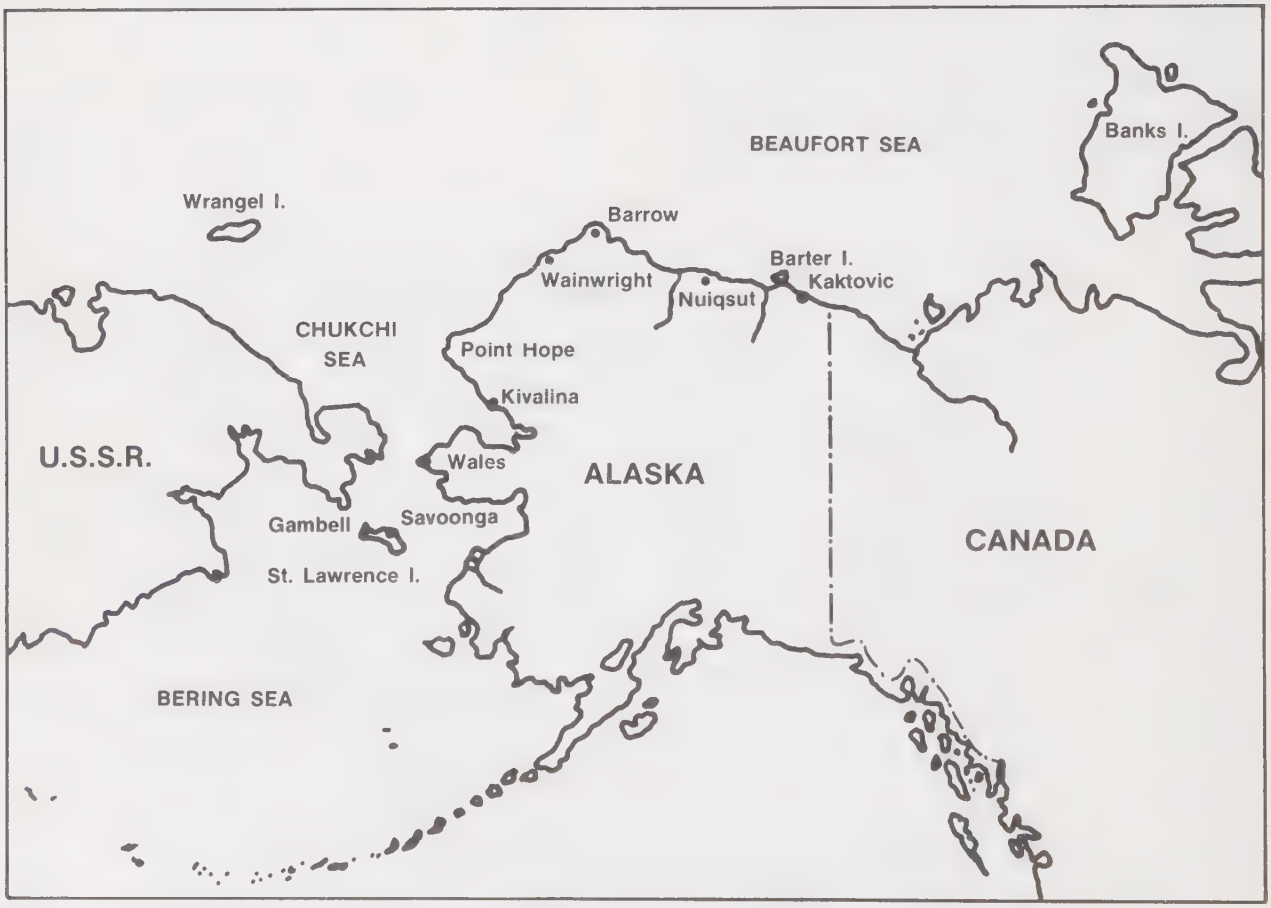


Figure 24.--Location of major whaling villages.

During the fall 1978 hunt, two whales were landed and one struck and lost. The total harvest for calendar year 1978 was 12 whales landed and 18 struck, equal to the quota established in December 1977 and less than the quota of 14 landed and 20 struck established by IWC in June 1978.

Eskimo reporting officers were the primary contact between Government agents and the whaling crews. These reporting officers and Alaska Eskimo Whaling Commission representatives worked with NMFS agents daily to implement the management program.

Returning Management of Marine Mammals to States

Alaska. MMPA allows a waiver of the moratorium on taking and a return of management of marine mammals to individual States. The decision to conditionally return management of seven species of marine mammals to Alaska was made in regulations published on January 9, 1979, concurrent with a decision by the U.S. Fish and Wildlife Service (FWS) to conditionally return management of three other species. The regulations stipulate that marine mammal management will be returned to Alaska when it revises its own laws and regulations to conform with MMPA and with Federal rules. Changes in State laws and regulations will be subject to public review and comment before the Department of Interior and the Department of Commerce give final approval to lifting the present ban.

Under the terms of the waiver, up to 6,648 northern sea lions, 10,511 land-breeding harbor seals, 5,700 largha seals, 20,000 ringed seals, 500 ribbon seals, 9,000 bearded seals, 350 Bering/Chukchi Sea stock beluga whales, and 10 Cook Inlet stock beluga whales may be taken annually.

California. In 1977, the State of California, responding to an inquiry from NMFS, indicated an interest in resuming management of their marine mammals. In 1978, NMFS and the California Department of Fish and Game began planning an integrated Federal/State Coastal Marine Mammal Research and Management Program to fulfill the requirements of the Act.

Oregon and Washington. The States of Oregon and Washington have submitted to NOAA a joint research proposal that addresses coastal seal populations.

Cetacean Program

Gray Whale. The Southwest Region surveyed the California coast and found commercial partyboat charters available for whale watching at ports from San Francisco to San Diego. NMFS will monitor whale watching along the coast and will continue to inform the public of the possible harm to whales from this activity. NMFS will cooperate with scientists from the Mexican Department of Fisheries in a 5-year research program to investigate the habitat needs of the gray whale and to monitor changes in their abundance that may have resulted from human use of coastal marine ecosystems.

Humpback Whale. About 500 humpback whales, or almost 60 percent of the entire North Pacific group of the humpback whale, winter in the offshore waters of Hawaii. Both breeding and calving occur during this period. These marine giants have been slow to recover from years of overexploitation; only about 5 percent of their estimated original population exists today. In January 1979, NMFS issued interpretative regulations on harassment to protect the humpback whale from the rapidly growing numbers of persons "whale watching" off Hawaii.

A brochure on humpback whales published by the NMFS Western Pacific Program Office in cooperation with the Lahaina Restoration Foundation is available at NMFS offices in Honolulu, Hawaii; La Jolla, California; and Washington, D.C. The brochure lists what activities are considered as harassment of humpback whales under the Endangered Species Act (ESA) and the Marine Mammal Protection Act.

A study is underway to identify and describe the distribution, abundance, and migration patterns of the separate North Pacific stocks of humpback whales. Aerial and vessel censuses have been made of the breeding and calving areas in Hawaiian waters and off Baja California. Population censuses and experimental radio taggings were made in feeding areas in southeastern Alaska waters and Prince William Sound, Alaska. Whales in all areas were photographed for individual identification.

Whale Stock Assessment. Studies by the NMFS Northwest and Alaska Fisheries Center on the status of whale stocks under IWC management jurisdiction are being made to determine the effects of commercial whaling. The Center is reviewing theory on the population and ecosystem dynamics of whales and is developing an automated retrieval system for whaling data from all ocean areas.

Bottlenosed Dolphins. The entertaining and easily trained bottlenosed dolphin (Tursiops truncatus) is frequently requested by applicants for public display permits. To prevent this popular marine mammal from possible overexploitation, the NMFS Southeast Fisheries Center has started a three-part research program along the U.S. coast from North Carolina to Texas where they will assess the size of the bottlenosed dolphin population.

Pinniped Program

Hawaiian Monk Seal. Under MMPA, NMFS designated the Hawaiian monk seal as depleted in July 1976. The species was listed as endangered under the Endangered Species Act in November 1976. The Marine Mammal Commission recommended that a portion of the Hawaiian monk seal's range be considered for designation as critical habitat as required by ESA. At this time, NMFS is preparing a draft environmental

impact statement (DEIS) evaluating critical habitat alternatives for the monk seal. Before preparing the DEIS, NMFS assessed the monk seal's habitat requirements and worked closely with the State of Hawaii to develop habitat alternatives. A recovery team for the Hawaiian monk seal will begin operating in 1979.

In 1976, biologists at the Northwest and Alaska Fisheries Center and the FWS National Bird and Mammal Laboratory, and Marine Mammal Commission contract researchers began a long-term cooperative study of Hawaiian monk seal biology. Recent censuses indicate declines in most island populations. Recent counts are about 50 percent lower than counts in the late 1950's.

During the 1978 season, substantial mortality was recorded in the Laysan Island population. Scientists recovered 23 dead animals, and censuses indicate that up to 50 animals may have been lost. Although biologists and specialists in bacteriology, parasitology, pathology, toxicology, and virology spent considerable effort, the cause of mortality remains unknown. The last Hawaiian monk seal in captivity died in December 1978 at the Waikiki Aquarium, Honolulu, Hawaii.

San Miguel Island, Calif. San Miguel Island is a unique habitat where six species of pinnipeds haul out. Each year, the Northwest and Alaska Fisheries Center studies the population, biology, and behavior of the California sea lion, northern sea lion, northern fur seal, Guadalupe fur seal, harbor seal, and northern elephant seal that use this island.

Northern Fur Seal - Pribilof Islands. NMFS monitors the status and population of the northern fur seal herds on the Pribilof islands and makes biological and ecological studies required by provisions in the Interim Convention for the Conservation of Northern Fur Seals. The treaty between Canada, Japan, the Soviet Union, and the United States enforces a conservation program that has allowed the fur seal populations to increase from a low of 300,000 animals in 1911 to a present population of 1.5 million.

As provided in the Convention, the United States annually harvests about 25,000 2- to 6-year-old bachelor males. The commercial harvest takes neither females nor pups. During recent years a great deal of research has been done to assure that the method used to kill seals is the most humane possible. Both Government-sponsored and private organizations have studied this subject in detail, and many of their recommendations have been adopted. St. George Island, one of the two main Pribilof islands, has been established for an indefinite period as a nonharvest research control area for comparative studies with the harvested fur seal population on St. Paul Island.

By law, the United States is responsible for the Aleut residents of the islands, who were brought to the Islands in 1786 by Russian explorers. The Alaska Native Claims Settlement Act of 1971 authorized the Aleuts to select about 94 percent of the total land area of St. Paul Island and 97 percent of the total land area of St. George, including houses and surplus buildings. The selected land on St. George was conveyed to the Tanaq Corporation representing the residents of St. George on October 31, 1978. The selected land on St. Paul will be transferred to the Tanadgusix Corporation representing the residents of St. Paul Island in 1979. The Federal Government has retained all fur seal rookeries, a buffer zone around the rookeries and certain lands and buildings necessary for the administration of the island and management of the fur seal herds.

Public Display and Scientific Research

The use of marine mammals for research and public display is controlled by permit, Letter of Agreement, or other specific authorization. A major objective of this system is to ensure that when animals are taken from the wild, their populations or the ecosystem they inhabit are not significantly affected. A notice of permit applications, issuances, and modifications appears in the Federal Register.

In 1978, application instructions were revised, a Collector of Record system for collecting animals from the wild was started, and the use of Letters of Agreement for permanent placement of beached and stranded animals was increased. All permit data have been placed in a computerized Management Information System for Marine Mammals and Endangered Species (MAMES). During 1978, 51 applications were considered, 34 permits were issued, 9 Letters of Agreement were signed, and 25 modifications or amendments to permits were made.

Revised application instructions have reduced the number of applications required when more than one type of activity involving the taking of marine mammals is requested or where the same animal is also covered by the Endangered Species Act or Fur Seal Act (FSA). Eight types of permits issued by NMFS under the three Acts (ESA, FSA, MMPA), including a combination of research and display activities, can be requested in a single application.

Letters of Agreement have proven an effective way to ensure that live marine mammals not covered by a permit are provided the same level of care and maintenance as required for animals covered by a permit. The increased number of rehabilitated beached and stranded animals has increased the need for this alternative.

The new Collector of Record system allows experienced marine mammal collectors to submit an expanded version of the basic information required of permit applicants on their capture operations. The Marine Mammal Commission and NMFS review this information before a Collector of Record is designated.

Beached and Stranded Marine Mammals

Based on recommendations developed at the Marine Mammal Commission sponsored Marine Mammal Stranding Workshop, a system of regional stranding

networks has been established to handle beached and stranded marine mammals. These networks cover the same geographical areas as NMFS Regions and are coordinated by the Regional Offices. Membership in the networks includes researchers, curators of public display facilities, and State and local law enforcement agencies. All strandings are reported to the Regional Offices and, when necessary, to network members so that live beached and stranded marine mammals can receive proper attention and qualified scientists can determine the cause of death and stranding.

ENDANGERED SPECIES

Under the Endangered Species Act of 1973 (ESA), NMFS is responsible for developing and maintaining conservation programs for fish, wildlife, and plant species of the marine environment. Various species of seals, sea turtles, sturgeons, and whales are now in danger of or threatened with extinction. Endangered species under NMFS jurisdiction are blue, bowhead, fin, gray, humpback, right, sei, and sperm whales; Caribbean, Hawaiian, and Mediterranean monk seals; shortnose sturgeon; and green, leatherback, hawksbill, loggerhead, Kemp's (Atlantic) ridley, and olive (Pacific) ridley sea turtles. Jurisdiction of sea turtles is shared with the Department of the Interior. ESA, with exceptions, prohibits taking, importing, or exporting endangered species and their parts or products.

Under the ESA Amendments of 1978, greater responsibilities have been placed on the implementing agencies. Critical Habitat must be declared at the time of original listing of a species, and recovery teams must be formed to produce a plan to attempt to restore the species. Public participation and review procedures have been added. Interagency cooperation and consultations have been strengthened as called for under Section 7 of the ESA. Section 7 requires all Federal agencies to review their programs and assure that the actions they authorize, fund, or carry out do not jeopardize the continued existence of threatened or endangered species or result in the destruction or modification of their Critical Habitats. The 1978 Amendments created an Endangered Species Committee to resolve conflicts among Federal agencies concerning listed species. NMFS provides information and analyses to the Administrator of NOAA, who is one of the seven members of the Endangered Species Committee.

Recovery Teams. NMFS established recovery teams for the endangered shortnose sturgeon, the Hawaiian monk seal, and six species of endangered and threatened sea turtles under U.S. jurisdiction. These teams are to produce plans that will help restore the stocks of these species. Both government and private sector scientists make up the teams, which exchange data, review technical reports, identify research and management needs, and advise on conservation efforts.

Listing of Species. NMFS finalized the listing of additional marine species as threatened or endangered, including; (1) the totoaba, a sea trout fish from the Mexican waters of the Gulf of California, whose depletion is partially caused by past commercial catches and some importation into the United States; (2) the Caribbean monk seal, which may be extinct, but will be listed in order to afford instant protection to any populations that may still occur in isolated localities in the Caribbean; and (3) the Guadalupe fur seal, which occurs in low population numbers on one of the Channel Islands off southern California.

Interagency Cooperation. NMFS is working with the Fish and Wildlife Service (FWS) to develop joint regulations to implement consistently the requirements for Section 7 consultations between Federal agencies. NMFS and FWS are developing joint regulations for Section 4 of the Act dealing with determination of Critical Habitat and listings of endangered and threatened species. The Departments of Commerce and Interior have published proposed regulations describing procedures for applications for exemptions to the requirements of Section 7 of the Act.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In an advisory capacity to FWS, the management authority of CITES, NMFS participates in the development of U.S. policy and regulations.

The import, export, re-export, and introduction from the sea of Convention animals are controlled by the U.S. Management Authority for the Convention through a system of permits and enforcement.

As a member of the Scientific Authority of the Endangered Species Convention, NMFS evaluates applications for permits to trade in Convention species.

Sea Turtles. The listing in July 1978 of three species of sea turtles (loggerhead, green, and olive Pacific ridley) as threatened or endangered fulfilled a long-standing commitment by NMFS to conserve all species of sea turtles under its jurisdiction. Because sea turtles are caught in shrimp trawls, the Southeast Fisheries Center is developing an excluder panel (see fig. 28) for trawls that will reduce the incidental catch of sea turtles without reducing the catch efficiency of the trawls. Initial tests show the excluder nets are able to maintain good shrimp catches while significantly reducing the bycatch of turtles. The first evaluation of the excluder panel on twin trawls was made on the Tortugas, Fla., fishery grounds in cooperation with commercial fishing vessels.

Information on the incidental capture of sea turtles by shrimp trawlers off South Carolina and Georgia was recorded through interviews with shrimp captains, observers on board shrimp vessels, and beach "wash ups" of dead turtles. The data gathered are being analyzed to provide estimates of the mortality of sea turtles due to trawling.

The charter vessel, LADY WEESA, sampled the Port Canaveral Channel to determine the extent and duration of turtle hibernation and concentrations. An aerial nesting survey of Florida beaches was

Figure 25.--Eight-hour-old loggerhead turtle.

Figure 26

Loggerhead turtles hatched by Nova University are released for return to the ocean (fig. 26 and 27). The loggerhead has been listed as "threatened" and regulations designed to conserve the species are in effect.

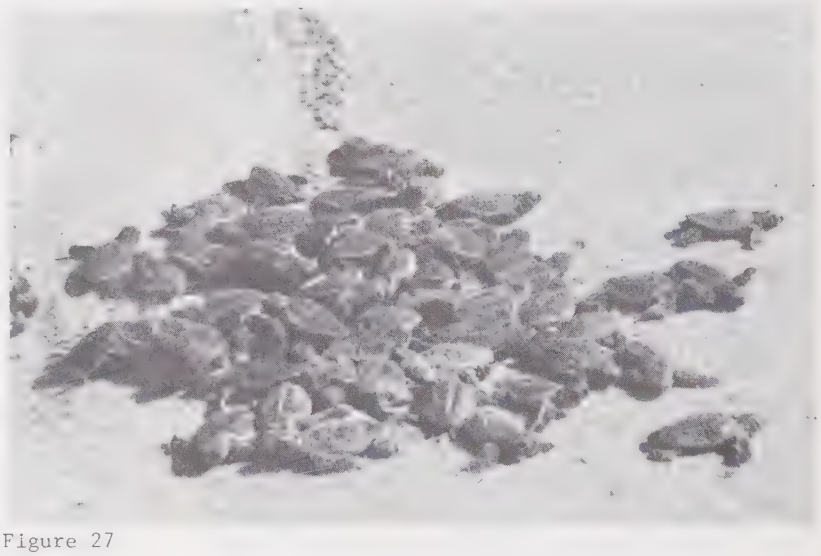


Figure 27

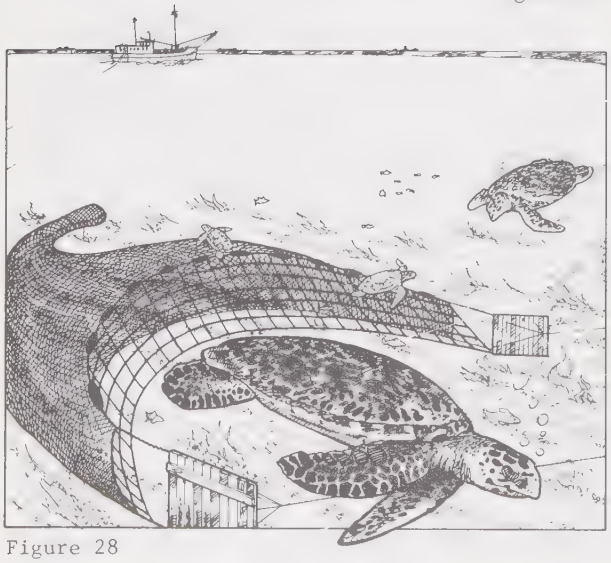


Figure 28

Fig. 28 to the left shows excluder panel for trawls that will reduce the incidental catch of sea turtles without reducing the catch efficiency of the trawls.

completed, and an estimate of the Florida population of adult loggerhead sea turtles was made. An aerial survey of nesting beaches along the northern Gulf of Mexico from the Florida-Alabama State line to the Rio Grande revealed little nesting in the area. Other supportive actions taken by NMFS to protect sea turtles include descriptions of critical nesting habitat for the leatherback sea turtle and critical overwintering habitat for the loggerhead and the Kemp's ridley in St. Croix, V.I. The sea turtle program has been carried out in consultation and coordination with interested environmental groups and the shrimp industry. In 1978, the Port Canaveral, Fla., navigation channel was proposed as Critical Habitat for loggerhead and Kemp's ridley sea turtles and the waters adjacent to Sandy Point Beach, St. Croix, V.I., were proposed as Critical Habitat for the leatherback sea turtle. The Port Canaveral navigation channel was declared a Restricted Fishing Area on November 22, 1978, for 120 days, which made it illegal to trawl in the channel during that period.

Seals and Whales. Research on endangered seals and whales is funded under both MMPA and ESA and is discussed in the Marine Mammal section of this report.

Salmon and Steelhead. In cooperation with the Fish and Wildlife Service, NMFS began an interagency review of the status of certain populations of salmon and steelhead in the Columbia Basin upstream from the confluence with the Snake River. This review will determine if any of these stocks should be proposed for listing as threatened or endangered, under ESA.

RESOURCE RESEARCH

NMFS conducts a multidisciplinary program of biological and socioeconomic research related to the protection and rational use of living marine resources for their aesthetic, economic, and recreational value to the Nation.

An important component of the NMFS research activity is the Marine Resources Monitoring, Assessment, and Prediction Program (MARMAP), whose mission is to assess continually the Nation's living marine resources. MARMAP has four components: (1) Resource Surveys uses NOAA ships plus chartered vessels to sample the abundance of fish and shellfish in their egg, larval, juvenile, and adult stages by area and by season; (2) Fishery Engineering applies advanced technology to collect resources information and to ensure the rapid collection and processing of data; (3) Fishery Oceanography defines the influence of natural environmental factors on the distribution and abundance of living marine resources; and (4) Fishery Analysis takes the data from resource surveys, fishery oceanography, and commercial and recreational fisheries to construct yield curves and mathematical population models, and to make forecasts and status-of-stock reports to support management decisions and plans. Information from MARMAP also serves as a basis for international negotiations on fishery issues in cooperation with the Department of State.

MARMAP activities during 1978 are described below on a geographical basis.

Northeast

Resource surveys were made by the research vessels ALBATROSS IV and DELAWARE II throughout the year in Continental Shelf waters between Nova Scotia and North Carolina. In addition to the 164 days of resource surveys, 63 days of special surveys dealt with sea scallops, ocean quahogs, surf clams, trawl testing, and sampling demonstrations, and 237 days were spent on cooperative surveys aboard Canadian, Polish, Russian, Spanish, and West German research vessels for Atlantic herring, Atlantic mackerel, silver hake, red hake, squids, sea scallops, and other species. Also, 24 sampling trips were made aboard domestic fishing vessels to obtain information on the species, lengths, weights, and discards in the New England fishery.

Manned undersea surveys included research submersible surveys of the major bottom-oriented animals in the heads of Wilmington, Baltimore, and Washington Canyons south and southeast of southern New Jersey, and SCUBA diver surveys of surf clams and ocean quahogs off Rockaway Beach, Long Island, N.Y.

Atlases were prepared on the distribution and abundance of major bottom-oriented animals in the Middle Atlantic Bight.

To define stocks within Northwest Atlantic species, a mark (tag)-and-recapture program in cooperation with the State of Maine continued on Atlantic herring, and a comprehensive program of anatomical studies began, with silver hake being the first species studied.

Surveys of fish eggs and larvae (ichthyoplankton) yielded a comprehensive summary of the principal spawning areas and seasons for abundant fishes in the Northwest Atlantic. The estimated size of the spawning population of Atlantic mackerel in the Northwest Atlantic calculated from egg production compared well with the estimate calculated from stock assessments. Ichthyoplankton surveys also showed for the fifth consecutive year that larval Atlantic herring were scarce (none was found on northeastern Georges Bank) and larval sandlance (an important food for economically important fishes) were extremely abundant in the Northwest Atlantic.

To determine the age composition of major finfish and shellfish stocks in the Northwest Atlantic, body parts (scales, otoliths, etc.) were examined from 15 major species/stocks.

Southeast

The Gulf of Mexico Fishery Management Council has identified the need for better estimates of growth and mortality to improve maximum sustainable yield (MSY) estimates for major shrimp stocks in the Gulf of

Mexico. The Southeast Fisheries Center's Galveston Laboratory, in response to the need of the Gulf of Mexico Council, began a major program of shrimp research in the Gulf of Mexico in 1977 with investigations of white shrimp stocks off Louisiana. During the spring, summer, and fall of 1978 a cooperative program was established with the Louisiana Department of Fisheries and Wildlife, Texas Parks and Wildlife Department, and the Instituto Nacional de Pesca of Mexico to begin mark-and-recapture experiments with brown shrimp in the western Gulf of Mexico. The objective of this experiment was to obtain estimates of growth, mortality, and migration of the brown shrimp stocks. Another objective was to delineate the stock boundaries of the brown shrimp resources from Corpus Christi, Tex., to Tampico, Mexico. Tagging began in May in "Sister" Lake, La., and Port Mansfield, Tex. To date, 81,266 tagged shrimp have been released in inshore areas and 26,894 released in offshore areas. In September, the NOAA research vessel, OREGON II, participated with Mexico in a major mark-and-recapture cruise off the Mexican coast, and 9,000 tagged shrimp were released from Brownsville, Tex., to Tampico, Mexico. More than 6,000 tagged shrimp have been recaptured to date, and these data are being analyzed to obtain reliable estimates of growth and mortality, and a delineation of the boundaries of the brown shrimp stock.

Significant accomplishments were made in research on both Atlantic and Gulf menhaden. For the Atlantic fishery, a data bank for historical population size was developed as were historical estimates of death due to natural causes and fishing. A yield-per-recruit model was developed that considers the effect of fishing effort in each area of the fishery and by season within each area. The model can be used to evaluate different management strategies that are being considered by a State/Federal management committee. In the Gulf fishery, initial estimates were developed for human-induced and natural mortality rates, allowing an evaluation of the impact of the fishery on the Gulf stock. Recruitment patterns of Gulf menhaden into the fishery were also determined from results of a juvenile tagging program. An evaluation was begun on the application of remote sensors to determine ocean current flow and the ultimate recruitment of Gulf menhaden. Background work on the coastal herring resources began in 1978 in preparation for the potential development of a management plan for the Gulf of Mexico Council.

Center personnel were actively involved in management-related activities for Atlantic and Gulf menhaden and for the coastal herring resource. Menhaden program personnel served on the Atlantic Menhaden Scientific and Statistical Committee, the Atlantic Menhaden Population Dynamics Subcommittee, and the Gulf Menhaden Advisory Committee, all sponsored by the State/Federal Fisheries Management Program.

Resource assessment surveys of U.S. Continental Shelf waters were made from Cape Hatteras to Florida under contract with the State of South Carolina. These surveys focus particularly on reef fish communities and the snapper-grouper complex.

The R/V OREGON II made surveys of Navassa Island, Navidad-Silver Bank, Puerto Rico, and the Virgin Islands. Reports of stock abundance were prepared for the use of the Caribbean Council.

With the use of the remote underwater fishery assessment system (RUFAS), calico scallops were surveyed off Cape Canaveral and the Florida Panhandle. In cooperation with the Northwest and Alaska Fisheries Center, RUFAS was used in Alaska to survey king and tanner crabs.

Assessment of reef fish resources is difficult because of the non-trawlable bottoms. One assessment method is visual observation. To study this method, the Southeast Fisheries Center completed 486 over-the-side TV camera stations off the west coast of Florida and off Alabama, Louisiana, Mississippi, and Texas.

Southwest

Determining the relation between stock size and survival of the year class has been an active area of research in the Southwest Fisheries Center for some time. A significant contribution toward solving this problem occurred in 1978 when an acoustic resonance frequency sonar technique was developed to determine the size of individual pelagic fish in schools. This technique has been assessed by independent academic acousticians who consider it a breakthrough and a step toward determining recruitment into a fishery by rapidly counting the prerecruits. At the same time, density-independent criteria for larval survival were developed that may be used to predict the success of an incoming year class. Careful and continual assessment of environmental conditions during the anchovy spawning season has indicated that stability of the ocean's upper mixed layer is a major criterion for success of larval feeding, because it allows food for larval fish to aggregate and provide enough nourishment for the larvae. When storms of upwelling disturb the upper layers of the ocean during a fish's spawning season, larval feeding grounds are destroyed.

Scientists in the Southwest Fisheries Center developed a technique of great significance in determining the growth and survival of larval fish in the sea. Scientists have shown that fish larvae can be aged by counting the daily rings on their otoliths or ear bones. From this, it has been determined that the anchovy larvae captured during the 1978 California Cooperative Oceanic Fisheries Investigations (CalCOFI) survey were growing at the maximum rates observed in the laboratory. Since Center scientists published the first information on this technique, the methodology has been adopted by researchers in other NMFS laboratories and throughout the world.

The Tripartite Cooperative Agreement for the Survey and Assessment of the Northwestern Hawaiian Islands was formally signed in 1978 by FWS NMFS, and the Board of Land and Natural Resources of the State of Hawaii. The agreement paves the way for a projected 5-year cooperative program to survey and assess the living resources in the terrestrial, nearshore, continental slope, and pelagic zones of the area, as

Figure 30.--White shrimp.

Figure 29.--A Galveston Laboratory biologist adjusts temperature control on shrimp holding tank for maturation studies.

Figure 31.--Brown shrimp.

well as to study the interrelationships of organisms in these zones. The program is also intended to (1) determine a baseline magnitude of the wildlife resources of the Northwestern Hawaiian Islands and the living resources on which they prey, (2) assess the effect of proposed commercial and recreational fishing on the living marine resources and the associated wildlife resources, and (3) provide whatever other information may be pertinent to a rational determination of the desirability of permitting commercial and recreational fishing in waters surrounding the Northwestern Hawaiian Islands.

Procedures have been developed to use surface maritime data to define the effects of atmosphere on the ocean environment on smaller space scales than possible heretofore. These have enabled critical environmental processes to be described on scales approaching those which may actually affect fishery stocks. This approach has been fruitful in generating testable hypotheses of interactions between environment and fisheries. For example, a striking correspondence has been found between spawning habits of commercially important fish species in the California Current and patterns of ocean surface drift. The tendency is for spawning to occur at times and locations of minimal offshore transport. Apparently, loss of eggs and larvae from the favorable near-coastal regions strongly affects reproductive success. An upwelling index, which is a measure of intensity of offshore transport of water, has been used to explain variations in the stocks of northern anchovy, Pacific mackerel, Dungeness crab, coho salmon, and Atlantic menhaden. The use of maritime data for fishery-environmental work is particularly cost effective, because no observational investment is required; the data are routinely taken for weather forecasting and other nonfishery national requirements.

Northwest and Alaska

In 1978 a considerable amount of research effort was directed to determining the nature, extent, and condition of fishery resources of the northeastern Pacific and eastern Bering Sea. In the eastern Bering Sea, the annual survey of king crab, Tanner crab, and groundfish using NOAA vessels and chartered trawlers took place, and, in the same region, there was a special cooperative fishing industry-government evaluation of the clam resources. The cooperative clam study was a followup of 1977 research, when a sizeable resource of surf clams was found along the northern side of the Alaska Peninsula. Although the area encompassing the surf clam beds is extremely small (1,200 square miles) relative to the size of the southeastern Bering Sea (71,000 square miles), the biomass of the surf clams is estimated at 286,000 metric tons, with a potential yield of some 19 to 25 million pounds of meats per year. The 1978 cooperative study was aimed at (1) evaluating the economic feasibility of a fishery, which included harvesting trials, yield and quality studies, and measurements of the amount of paralytic shellfish poisoning (PSP) in the clam population, and (2) collecting further information on the biological characteristics of the clam population and the environmental effect of clam dredging in order to develop a fishery management plan and an environmental impact statement. Those involved in the cooperative study were Alaska Department of Commerce, Alaska Department of Fish and Game, NMFS, North Pacific Fishery Management Council, and eight commercial companies. Northwest and Alaska Fisheries Center (NWAFC) personnel were involved in the biological and PSP segment of the study. Results of the overall study are being evaluated, but indications so far indicate that, with proper harvesting equipment, a commercial fishery may be possible. PSP incidence was low, but if a fishery did develop, the clam meats would have to be monitored periodically for PSP.

In southeastern Alaska waters, NWAFC personnel were involved in project SEA SUB using the submersible NEKTON GAMMA and a support vessel, the chartered crab vessel, ANTARES. The NEKTON GAMMA (see fig. 32) carries a crew of one, the pilot, with room for one observer, and can dive to a maximum depth of 1,000 feet. The research in Alaska was supported by NOAA's Manned Undersea Science and Technology (MUST) Office and NWAFC, and was directed at (1) evaluating the effectiveness of crab pots, fish traps, and hook and line gear as it relates to fishery resource assessment and interpretation of fishery statistics (catch and effort); (2) studying the distribution, density, and kinds of animals living over rocky bottom areas that are inaccessible to sampling by conventional trawl gear; (3) determining the extent and composition of coral beds; and (4) comparing the differences in biota and habitat between marine areas exposed to pollution and logging effects and those areas relatively free from these human-related effects. Fishing gear observations were quite revealing. In bottom areas subject to strong currents, the heavy fish traps and crab pots were observed to be dragged along the bottom by the current and sometimes turned over on their side or upside down. The light, conical fish traps were usually upside down and not fishing. With hook and line gear, octopus bait stayed longer on the hooks than herring bait. The latter was quickly stripped from the fish hooks by various bottom scavengers. Another unexpected result from project SEA SUB was the observation that extensive inshore rocky bottom areas were nursery grounds for the young of such important species as Pacific ocean perch and pollock.

The MARMAP program at the Auke Bay, Alaska, Laboratory is oriented towards identifying and assessing those factors and/or processes influencing year-class strength in fish and shellfish species of the northeast Pacific Ocean. Studies focus on the early life history stages, which is the period when survival is most influenced by natural and human-induced environmental changes. Pacific herring, Pacific cod, walleye pollock, and rockfish are the species under investigation. Significant progress has been made in defining the vertical distribution, food habits, and growth of larval and early juvenile pollock.

As part of a cooperative research program with the State of Alaska, the biomasses of both juvenile and

Figure 32.--The submersible, NEKTON GAMMA, in operation during fishing and environmental research in southeastern Alaskan waters in 1978.

Figure 33.--Ten dives in the submersible NEKTON GAMMA were made in two areas in Southeastern Alaska to determine if concentrations of wood debris existed in deep waters adjacent to an area of intensive logging and an unlogged area.

adult herring were acoustically assessed in two environmentally different study areas in southeastern Alaska. To establish catch quotas in these areas, the State subsequently used the biomass estimates of the adult herring population.

Resource Statistics

NMFS resource statistics programs collect data on fish landings, effort, processing, employment, foreign trade, as well as other social and economic data. Collection of these data requires survey design, because most of this information is obtained by public surveys. Major activities during 1978 involved developing plans for collecting social and economic data, initiating a new survey to collect marine recreational fishery statistics, and developing cooperative agreements with the States for collecting fishery data. Major emphasis has been on collecting data for developing and monitoring fishery management plans as required by FCMA.

Major efforts are focused on a 5-year plan for the collection of social and economic data needed for fishery management. Two contracts were let, one for marine recreational fisheries and one for commercial fisheries, to survey data available and to determine priority data needed by the Regional Fishery Management Councils and others. The contract for marine recreational fisheries includes development of the survey methodology to collect the high-priority data that now are not available. Data needs on the commercial fisheries will be determined by regional panels comprising scientists working on fishery management problems, Regional Fishery Management Council staffs, and NMFS personnel. The contract studies are to be completed in June 1979 and the 5-year plan developed by August 1979.

The Marine Recreational Fisheries Statistics Program has contracted for a national survey of marine recreational fishing. The survey began November 1, 1978, and will continue through October 31, 1979. It is the first in a series of planned annual surveys of marine recreational fisheries. This survey is designed primarily to obtain data on participation, catch, and effort.

In mid-1977, NMFS began planning a national survey of marine recreational fishing. The survey design is based on an extensive methodology study completed in December 1977. The survey includes a combined telephone and on-site intercept (creel) survey—a random-digit-dialing telephone survey to obtain participation and effort data, and an intercept survey to obtain catch by species. The telephone survey is being made at 2-month intervals; the intercept survey is being made continuously throughout the 12-month period. During the intercept survey, interviewers are contacting fishermen on boats (party, charter, rental, and private boats) as well as persons fishing from shore. Results from the telephone and intercept surveys will be combined to produce various estimates of catch, participation, and effort.

The areas included in the 1978-79 survey are States along the Atlantic and Gulf of Mexico coasts, Guam, Hawaii, Puerto Rico, American Samoa, and the U.S. Virgin Islands. Plans are underway to begin surveying the Pacific Coast States of California, Oregon, and Washington in early summer 1979. In the future, the survey will be made concurrently in all geographic areas and will include as much of the United States and its possessions as possible.

Data on Atlantic billfishes and shark catches by marine recreational fishermen were needed for a preliminary fishery management plan. A combination mail and telephone survey was designed, and data collected for a 1-year period.

Efforts to obtain cooperation of the States in the collection of fishery statistics continue. An agreement was signed with the California Resources Agency, Department of Fish and Game, for the collection and management of fishery data. A similar agreement has been negotiated with Alaska. Also, efforts to obtain more State cooperation in the collection of fishery statistics are progressing in the Northeast and Southeast.

Fishery Market News Reports are published three times a week at Boston, Mass., New York, N.Y., New Orleans, La., Terminal Island, Calif., and Seattle, Wash. The reports show fishery landings, receipts at major markets, exvessel and wholesale prices, cold storage holdings, and other information of interest to fishing and allied industries. Originally, the reports were mailed free on request. However, since 1975, the reports have been sold by subscription. Fishery Market News Reports are the only fishing industry source for timely information on supplies of fishery products, markets, prices, and other trends and developments.

UTILIZATION AND DEVELOPMENT

The NMFS fishery utilization and development program is an integral part of the Service's overall plan to achieve optimum management and use of this Nation's fishery resources. The benefits of this program include (1) providing alternatives to management actions that curtail fishing operations in order to conserve fishery resources; (2) developing economic growth through encouraging harvesting, processing, and marketing developable resources; (3) reducing an over $2 billion fishery trade deficit by using U.S.-caught fish to substitute for some imports and by developing markets; and (4) assuring a steady U.S.-controlled supply of seafood to contribute to improved nutrition in the United States.

Achievement of these potential benefits is obtained by an active and innovative partnership among the fishing industry, State and local governments, and the Federal Government, with commitments of time and resources.

Development activities are also coordinated with programs of other agencies, including NOAA's Office of Sea Grant in providing fishery research, education,

and advisory services; the Economic Development Administration in assisting industry's economic development, infrastructure development, and technical experience development projects; and the Industry and Trade Administration in helping industry export products through trade fairs, export seminars, and trade missions.

The widely varying nature of the problems in different areas of the country requires that the major work of implementing a national development policy be done on a regional basis. Federal agencies are to be organized for effective interface with State and local governments and the industry in planning and implementing programs. The Administration's fishery development policy and program will provide the framework for regional efforts to produce specific solutions to industry's needs.

In the future, Federal programs will concentrate on the development of nontraditional species, such as bottomfish off Alaska and squid off the East Coast, and the expansion of the industry into new areas, such as the Western Pacific tuna fishery. Federal policy will be to foster the development of all sectors of the U.S. fishing industry—including fishermen in our 200-mile zone, in the Great Lakes, and U.S. flag distant water fleets, and U.S. processors and distributors—through close working relationship with the industry and well-coordinated Government programs. This will involve:

- Providing foreign market access through Government negotiations and through better information on market conditions and trade opportunities, to increase foreign markets and help reduce our massive trade deficit;
- Facilitating industry access to private venture capital for vessels, processing plants, and support facilities by changing the existing regulations on the conditional fishery restriction for such access and through extension of existing tax deferral benefits to shore-based facilities;
- Reviewing Government regulations applicable to the industry to ensure fair and equitable treatment and an adequate basis for all regulatory actions;
- Conducting research and providing consumers with information on the safety and nutritional value of seafoods in the U.S. diet;
- Satisfying the need of the major fishing industry in some regions for publicly financed infrastructure such as ports and harbors;
- Adapting existing technology and disseminating technological information to allow the industry to modernize and improve its capital facilities; and
- Coordinating Federal agency personnel so that industry can work more effectively with those responsible for implementing Government programs.

This fishery development program will enable the fishing industry and State and local governments to use better existing Federal Government programs for industry assistance and economic development.

Fishery Development

The development of new fisheries is a cooperative industry/Government process of analyses and actions on a region-by-region, species-by-species basis. This approach includes (1) formation of industry groups to facilitate industry and Government cooperation and industry-initiated efforts; (2) economic assessments of the availability of resources, the availability of technology, production costs, market demand and prices, and sociological or technological transfer problems; and (3) consideration of impediments to development, which include the transfer of existing harvesting and processing technology from one fishery to another and demonstration of its applicability to industry, and cooperative actions with industry, and other agencies to encourage trade between U.S. distributors and foreign importers.

The New England Fisheries Development Program (NEFDP) continued efforts to promote alternative species available to New England fishermen in an attempt to relieve hardships caused by management actions on traditional groundfish species.

One such species is silver hake (whiting). Historically, New England fishermen have harvested about 15,000 metric tons annually. This represents about 15 percent of the 1978 total allowable catch. Although some of this catch goes into the "fresh market," most is processed as frozen dressed product.

During 1978, about 10,000 metric tons of whiting fillet blocks were imported into the United States. Most of these fillet blocks were processed into sticks and portions. A ready market exists for good-quality whiting blocks.

NEFDP, with the cooperation of a New England processor, held a feasibility demonstration using domestically caught whiting and newly developed processing machinery to produce fillet blocks. About 5,000 pounds of blocks were produced and delivered to industry for evaluation. The economics of such a venture appear to be profitable, and plans are being developed to encourage commercial production of whiting fillet blocks in 1979.

Atlantic mackerel was also the subject of intense effort by the NEFDP in 1978. Several product forms have been prepared and are being tested for economic feasibility and consumer acceptance.

Considerable progress has been made in integrating development activities of the fisheries utilization and research laboratory at Charleston, S.C., with the Southeast Region and the fishery development programs of the Gulf and South Atlantic Fisheries

Development Foundation. A joint Division, Foundation, Coastal Plains Regional Commission, and industry trade mission to Africa in November 1978 has opened very large, high-value markets for mullet, groundfish, and other species. NMFS has also worked with industry in the Southeast to achieve record exports of blue runners, butterfish, king mackerel, mullet, ladyfish, and little tunny, to Asia and Europe. NMFS also participated in two international food shows and in the Gulf and South Atlantic Fishery Development Foundation Midwest Marketing Program that introduced Southeast species of fish and shellfish in 25 midwestern cities.

Studies were completed on refrigerated shelf-life of croaker and sand trout, the use of mechanical methods to improve the functional properties of frozen blocks of minced croaker and the frozen storage quality of minced croaker prepared from fresh fish held in refrigerated seawater and held on ice.

The Alaska Fisheries Development Corporation (AFDC), a nonprofit fishermen/processor organization was formed and incorporated in 1978 for coordinating and conducting projects to facilitate development of Alaska bottomfish and other underused fishery resources off Alaska. NMFS Regional staff helped form AFDC and helped plan and submit fishery development projects for funding.

The second-year phases of the cooperative industry/Government Bering Sea subtidal clam survey was organized and conducted in the Bering Sea. Laboratory analyses for paralytic shellfish poisoning were made on clam samples. Environmental impact studies are still to be completed.

Constituency services, such as provision of economic, marketing, and statistical data and technical information were furnished to many industry people. These services have contributed to the increase in Alaska catch of bottomfish from 4.7 million pounds in 1977 to 9.9 million pounds in 1978.

NMFS personnel worked with the packaging division of a U.S. company in applying the firm's vacuum wrap technique to seafood products. A major salmon processor cooperated and adopted the vacuum wrap process for all frozen salmon exported in 1978. This development will have a major effect on salmon quality in the marketplace.

NMFS became increasingly active in foreign trade matters. Activities included organizing and participating in trade seminars and meeting with Government and industry officials from Denmark, Indonesia, Japan, Korea, Norway, and Portugal.

The first steps toward organizing an industry-oriented fishery development organization on the West Coast was initiated through a NMFS contract with the Pacific Marine Fisheries Commission. The industry was consulted through a series of meetings on alternatives for geographic region, specific fishery, and funding support for a Government/industry-supported organization. The contract culminated in a conference held in Portland, Oreg.

A concerted effort was directed to assimilating information in the form of directories that would enhance fishery development. The following three directories were prepared and disseminated:

1. A directory of data collection projects on West Coast fisheries, January 1978.

2. Fishery products importers, exporters, and brokers, June 1978.

3. Aquaculture directory, October 1978.

The Southwest Region is responsible for the overview of programs authorized by the Congress under the Central, Western, and South Pacific Fisheries Development Act, as amended (Public Law 95-295). The programs, administered and conducted under contract with the nonprofit Pacific Tuna Development Foundation (PTDF), provide a unique blending of financial and technical expertise from Government, U.S. tuna industry, and Pacific Islands Development Commission to develop tuna and other latent resources.

Again in 1978, the Foundation planned a full program of Island and tuna industry projects using $1 million from the Saltonstall-Kennedy reserve fund and $120,000 provided by the U.S. tuna industry as matching funds. One project in particular, the Mid-Atlantic Albacore Trolling Project, is worthy of note, because 1978 marked another year of highly successful catch rates as well as the conclusion of PTDF support for this experimental fishery.

Originally, the 1978 albacore trolling project was intended as a prototype commercial venture consisting of a mothership (vessel) stationed off Midway to provide support for a fleet of 14 trollers and 2 baitboats. However, the numbers of tenders submitted were insufficient to provide even this small fleet of qualified vessels. The project was modified subsequently to include only a four-vessel charter to continue an expanded version of the exploratory fishing tactics developed previously.

Vessel departures were spaced temporarily during May and June from ports in Alaska, California, and Hawaii. These factors plus the size variation of each vessel allowed one or two members of this small fleet to remain on the fishing grounds while the others were unloading in Honolulu. This relay system was instrumental in reducing search time considerably. The four vessels unloaded a total of 235 tons of albacore during the survey.

Market Analysis

Results of ongoing economic analysis of fishery product markets were published in several issues of the three Market Review and Outlook reports (foodfish, shellfish, and industrial fishery products), and provided for use in other reports, including the NMFS Fishery Market News Reports, the U.S. Department of Agriculture's quarterly National Food Review, and

the Food and Agriculture Organization (FAO) Fishery Commodity Situation and Outlook.

Results of the NMFS informal management plans were reviewed technically, along with the Office of Sea Grant project proposals and various fishery market and economic research reports.

Fact sheets were developed and distributed on silver hake, Atlantic mackerel, and carp. Fact sheets on squid, pollock, and buffalofish were also developed, but will not be printed and distributed until 1979.

Vessel Safety and Insurance

NMFS continued to provide industry and Government agencies with technical assistance and guidance that lead to increased cooperation in matters of fishing vessel safety and insurance.

NMFS cooperated with the National Council of Fishing Vessel Safety and Insurance (NCFVSI), which was incorporated in January 1978 by representatives of the fishing and insurance industries. Further assistance was given the NCFVSI to begin publishing a quarterly newsletter on safety and insurance in August 1978, to establish a safety and insurance exhibition booth at Boston's Fish Expo '78 in October 1978, and to disseminate a poster on "Suggested Watchkeeping Standards of Food Practice" for fishermen.

A Fishing Vessel Safety Center was established at the University of Washington to concentrate on the safety problems of the fisheries of the Pacific Northwest and Alaska in cooperation with NMFS, the Office of Sea Grant, and the industry.

National School Lunch Program

During 1978, NMFS renewed a cooperative effort with the Food and Nutrition Technical Services Division of the U.S. Department of Agriculture (USDA) in connection with the National School Lunch Program.

Studies were undertaken to determine and evaluate the cooked yield of various market forms of fishery products now available to the school food service industry. In addition to yield determinations, quantity recipes for seafood are being developed to meet the dietary regulations established for USDA's Child Feeding Programs. The cooked yields of fishery products and the quantity seafood recipes will be incorporated in program aids to help schools plan, prepare, and serve lunches. These program aids include a Menu Planning Guide, a Quantity Recipe Card File, and a Food Buying Guide, which are used to determine the quantities of food needed to meet USDA's National School Lunch Program requirements.

Fishery Cooperatives

NMFS continues to provide fishermen and other interested parties with information on organizing and operating fishery cooperatives.

In response to complaints, NMFS investigates fishery cooperatives to determine if they are in compliance with requirements of the Fishery Cooperative Marketing Act of 1934, and are not monopolizing or restraining trade in interstate or foreign commerce to such an extent that the price of any aquatic product is increased unduly by the cooperatives.

Trade and Tariff

NMFS is actively working to open foreign markets for U.S. fishery products and to maintain a competitive position for the U.S. fishing industry. The primary purpose is to foster the development of underused species. NMFS has been providing continuous input to the Multilateral Trade Negotiations (MTN) in Geneva, Switzerland, aimed at reducing related tariff and nontariff barriers. NMFS has made a major effort through bilateral talks with Japan to improve access of United States fishery products to Japanese markets.

In an effort to reduce foreign trade barriers through MTN, NMFS has developed detailed requests for the reduction of foreign trade barriers. Inputs from the fishing industry were used to develop these requests. The focus has been on long-term prospects for underused resources. All material has been coordinated (with requests on other agricultural products) in the Office of International Policy, Department of Commerce, and supplied to the Special Representative for Trade Negotiations (STR).

NMFS also provided direct assistance to the Geneva negotiations. The Fisheries Attache for Europe and NMFS officials participated in bilateral talks with several countries. Information on NMFS positions has been furnished frequently to U.S. negotiators.

In an effort to foster growth and maintain employment of the U.S. fishing industry, NMFS has identified fishery products that are sensitive to import competition and thus require protection. These analyses have been provided to STR for use in negotiations.

In early October, NMFS participated in the U.S. Export Development Mission to Japan. The Mission was headed by the Secretary of Commerce, the Administrator of NOAA, and the Assistant Administrator for Fisheries. Other NMFS officials and members of the U.S. fishing industry participated. In response to this initiative and effort, Japan made tariff reduction offers in the MTN. Also, the Government of Japan promised to ease the access of United States fishery products to the Japanese markets. NMFS is currently monitoring Japan's modifications of its import quota system and its impact on United States fishery export efforts.

To ease the effect of subsidized foreign fisheries on the U.S. fishing industry, NMFS has assisted the industry in countervailing duty matters.

The Export and Domestic Market Study

The Export and Domestic Market Opportunities for Underutilized Fish and Shellfish report (also known as the Wexler Study) was reviewed in a draft form by various Federal and industry reviewers. The study focused on problems hindering the development of domestic and international markets for underused

fishery products in the various NMFS regions. In addition, the study provided information on 16 foreign markets. These included Japan, Korea, Nigeria, and Taiwan; Belgium/Luxembourg, France, Switzerland, and West Germany; Denmark, Netherlands, Sweden, and United Kingdom; and Greece, Italy, Portugal, and Spain. The final report (five volumes) is scheduled to be released at the National Conference on Fisheries Development that is planned for 1979.

Fishery Development Task Force

The benefits obtainable through fishery development are quite substantial. Scientists estimate that the U.S fishery conservation zone has enough fish and shellfish to double or triple the U.S. landings of seafood.

A Department of Commerce task force on fishery development has been formed to examine problems affecting the growth of the fishing industry in the United States. The task force will develop:

- A Department of Commerce policy statement on fishery development.
- A series of background papers on major concerns that must be considered in making decisions on the role of the Federal Government in fishery development. In addition, there will be several investment analyses of selected individual fisheries that appear to have development potential. These analyses will pinpoint opportunities, specify constraints to development, and propose options to eliminate these constraints.
- A proposal to streamline regulations that are burdensome or of questionable value to the fishing industry.

The task force will study the results of the Wexler study along with the background and investment analyses.

The results of the task force are scheduled to be available in 1979.

Resource Technology

A modified heading and cleaning machine was used successfully by a commercial processor to remove blood and belly lining from silver hake, leading to the preparation of excellent minced blocks.

Small, cultured surf clams, possible replacements for heavily exploited ocean quahogs, were shown to yield as much meat as other clams, and through organoleptic (appearance, flavor, odor) tests to be acceptable raw on the half shell, fried, or steamed.

Product quality was evaluated during studies on the frozen storage of Atlantic cod fillet blocks, bluefish fillets, red hake fillet blocks, silver hake, sand lance, and cownose sting ray.

Atlantic cod fillet blocks, incorporating minced flesh made from trimmings, were also evaluated as frozen precooked sticks and as sample blocks.

An English instrument used to measure fish deterioration was evaluated for precision and reliability on Atlantic cod, haddock, silver hake, and sand lance, by comparison with organoleptic evaluation and chemical and microbiological tests.

Interim recommendations for handling and processing hake to minimize inherent quality limitations were provided to fishermen and processors involved in this developing Pacific Coast Fishery. Studies of mushiness in fresh and cooked hake documented the role of protozoans, postmortem enzyme levels in the flesh, and potential means of inhibiting the enzyme in raw and processed fish.

Preservation studies on pollock showed that in addition to requirements for rapid handling and chilling aboard vessel, time-temperature factors during freezing and storage are also very important.

Seafood Quality and Inspection Division

During calendar year 1978, the total amount of edible fishery products inspected under the Voluntary Inspection Program was 617 million pounds. There were 60 plants participating in the Packed Under Federal Inspection program, 23 plants under Military Procurement Inspection, and 9 plants and 2 vessels under the Sanitary Inspected Fish Establishment Program, for a total of 94 facilities processing fishery products under the inspection program.

The Department of Defense turned over to the Department of Commerce the responsibility for inspecting fishery products for military use during 1978. This resulted in a continuing increase in the number of plants entering the seafood inspection program.

The Department of Commerce initiated a fresh seafood inspection program with a food corporation in Elizabeth, N.J, which operates 186 supermarkets in the mid-Atlantic and New England areas. This chain was the first to place a Department of Commerce inspection mark on its full variety of fresh fish.

The Standardization and Compliance Evaluation activities included completion of research and development of a prototype Model Nomenclature System for improving seafood-naming procedures; adoption, publication, and distribution of two Recommended International Codes of Practice for fresh and canned fish; adoption, on an interim basis, of the International Codex Standard for Frozen Lobsters; and amendment of the quality standards for frozen raw breaded and fried scallops.

NMFS participated in seven regional U.S. Department of Agriculture procurement workshops given for school lunch feeding personnel. The Seafood Quality and

Inspection Division presented the seafood segment of these "how to" procurement workshops, which will be replicated in the individual States by the people trained at the workshops.

A computer model that statistically estimated the risk to the health of U.S. consumers from the intake of mercury from seafood was developed under contract by the Seafood Quality and Inspection Division. Based upon the results, FDA revised its previous action level for mercury in fish from 0.5 to 1.0 parts per million. This revision, while continuing to provide the necessary protection to consumers, will provide significant economic benefit to both consumers and industry.

For the specific purpose of addressing national and regional issues in the area of contaminants in seafood products, a Congressional add-on of $600,000 was used at the Southeast Fisheries Center's Charleston Laboratory.

NMFS provided technical assistance in the production of sea food company film on inspected tuna processed for institutional use.

A research project by the Virginia Citizens Consumer Council (VCCC) was ccarried on in cooperation with NMFS. Two thousand members of VCCC was surveyed regarding fish consumption, attitudes toward inspected versus uninspected products, complaint handling, and so on. The president of VCCC reported the results at the Tropical and Subtropical Technological Conference held in Louisiana in April 1978.

Financial Services Division

Financial services are provided to the fishing industry under five authorities. They are the the Fishing Vessel Obligation Guarantee, the Fishing Vessel Capital Construction Fund, the Fishermen's Guaranty Fund, the Fishing Vessel and Gear Damage Compensation Fund, and the Fishermen's Contingency Fund.

The Fishing Vessel Obligation Guarantee program (46 U.S.C. 1271 et seq.) is continuing to expand. A total of $74.9 million in guaranteed loans for the debt portion of fishing vessel construction and reconstruction cost was approved in 1978. This amount may double during 1979. The total of outstanding guarantees, approved cases awaiting closing, and pending applications is now $180 million. Guaranteed financings closed in 1978 had an average interest rate of 8.93 percent. The program's guarantee authority was raised from $75 million to $250 million in 1978. Fees generated from program operations pay all administrative expenses. Legislation was passed to increase guarantees for fishing vessels from 75 percent to 87 1/2 percent of actual project costs, and the maximum maturity (for certain vessels) of guaranteed loans was administratively increased from 15 to 20 years.

The Fishing Vessel Capital Construction Fund program (44 U.S.C. 1177 et seq.), a tax deferral program, continued to generate equity capital for vessel construction and refurbishing. During 1978, 421 fishing vessel owners entered into CCF Agreements bringing the total to 1,530 agreements since the program's inception. Agreement holders deposited $48 million of 1978 operational income into the Fund and withdrew $29 million towards the accomplishment of the $702 million scheduled objectives of the Fund. In 1978, scheduled objectives increased by $225 million.

The Fisheries Loan Fund program (16 U.S.C. 742c) continued under moratorium during 1978.

The Fishermen's Guaranty Fund program, part of the Fishermen's Protective Act (22 U.S.C. 1971 et seq.), which indemnifies U.S. vessels against the risks of fishing off foreign coasts, insured 171 U.S. vessels in 1978. Thirteen seizure claims (10 seizures by Brazil and 3 by Mexico) totaling $476,751 were submitted in 1978.

The Fishing Vessel and Gear Damage Compensation Fund program (a newly added section of the Fishermen's Protective Act) which provided low interest loans to U.S. fishermen whose vessels or gear were lost, damaged, or destroyed as a result of foreign vessels operating in the U.S. FCZ was again amended (Public Law 376), on September 18, 1978, to change from a loan program to a direct compensation fund. The program now provides direct compensation to U.S. fishermen whose vessels are lost, damaged, or destroyed by foreign vessels operating in FCZ or whose fishing gear is lost, damaged, or destroyed by vessels whether foreign or domestic or by acts of God. The fund is now capitalized by a surcharge (not to exceed 20 percent) of annual fees paid by foreign fishermen in the U.S. FCZ. Program regulations will be available in early 1979.

The Fishermen's Contingency Fund. Title IV of the Outer Continental Shelf Lands Act Amendments of 1978 (Public Law 392) was passed on September 18, 1978, and established a fund to compensate fishermen for property damage or economic loss due to obstructions resulting from oil and gas exploration, development, and production on the Outer Continental Shelf. The program will be funded from assessments on holders of Outer Continental Shelf leases, permits, easements, or rights of way. Workshops involving the fishing and petroleum industries were planned for early 1979 to resolve major issues in preparation of program regulations, which should be available in 1979.

Consumer Affairs

The Division of Consumer Affairs prepared and presented a 2-hour program to the attendees of the National Food Editors Conference. The program featured a film strip on ocean fishery resources, "The Sleeping Giant," exclusive news releases, a Government/industry panel discussion of the increased fishery resources now available owing to the Fisheries Conservation and Management Act (200-mile limit), and taste testing of recipes made from underused species. The materials and information provided the food editors were published in many newspapers across the Nation.

Two Government/industry cooperative consumer education efforts were completed, one with a seafood company and the other with a sauce manufacturer.

The seafood company/NMFS effort was to create a 30-minute film on U.S. Department of Commerce-inspected tuna products that could be used by mass feeders, such as schools, mess halls, and large cafeterias. The script was developed cooperatively with the Consumer Affairs Division, the inspection service, and seafood company executives. The film was completed, and copies have been distributed for use.

The sauce company and NMFS completed the second in its series of full-color educational charts featuring USDC inspected products, nutritional equivalents per 3-ounce servings, and sauce recipes. The chart is to be released to consumers, educators, and supermarket fish departments in 1979.

Recipes with news releases were mailed to more than 900 food editors throughout the United States. The editors used the materials during Lent, summer cookout months, October fish and seafood month, and the Thanksgiving and Christmas holiday seasons.

A new slide presentation was developed on Truth-in-Menuing. The materials were aimed at educating restauranteurs to list fishery products accurately and truthfully on menus. The presentation was given at a series of training sessions sponsored by the District of Columbia Health Department, which has joined California and Illinois in efforts to prevent consumers from being victimized by the substitution of lesser quality foods.

At the request of the President's Adviser on Consumer Affairs, Esther Peterson, NMFS helped the U.S. Office of Consumer Affairs make a complete survey of all consumer affairs activities in the U.S. Government. The results of the report have provided the basis for a series of recommendations on how to strengthen and improve these activities in Government. Peterson is to present these recommendations to President Carter.

AQUACULTURE

Aquaculture is expected to benefit the U.S. consumer by increasing the supply of certain fish and shellfish that are in short supply and high demand. In addition, it offers the potential for rehabilitating certain endangered or threatened species, as well as enhancing recreational fisheries. NMFS' aquaculture programs are providing the biological and technological information needed by public agencies to augment natural stocks and/or by private industry for commercial development.

In the Northeast Fisheries Center, methods were developed for rearing seed surf clams longer than 10 millimeters in tank farms fed by ambient seawater. Young clams introduced in early May reached a marketable length (55 millimeters) by the end of July.

Methods were evaluated for improved growth and handling of cultured young bay scallops reared in fiberglass tanks. Five-millimeter bay scallops were grown either in a suspended net or in the tank bottom. Suspended scallops grew faster and were easier to handle, but these benefits were outweighed by the financial costs. Suspension nets may be economically feasible during heavy siltation and for introducing even smaller bay scallops.

Laboratory rearing of larval mollusks requires feeding them with nutritious microalgal species. A new technique, using epifluorescense microscopy, shows which microalgal species are ingested and digested by larval American oysters.

Molluscan hatcheries in estuarine areas where industrial runoffs contain heavy metals may have their food source (microalgal species) affected by pollutants. Studies were carried out to determine the acute and chronic tolerances of four microalgal species to zinc, cadmium, and copper. In some cases, microalgal species exposed to heavy metals during their culture showed no adverse effects, but they did affect detrimentally the survival and growth of the American oyster larvae that fed upon them.

The fourth year of a mass selection program was completed for fast- and slow-growing American oysters. The industry has been advised on the progress of this genetic breeding program.

An ozone quarantine system was developed to disinfect the effluent from tanks holding exotic oysters and their larvae. Determinations were made for the best flow rates, contact times, and ultraviolet doses needed to disinfect seawater containing bacterial pathogens of larval oysters.

During the past year, the Southeast Fisheries Center aquaculture program facilities at the Galveston Laboratory have been upgraded to include a large greenhouse building for rearing marine turtles, improved seawater systems, larger tanks for shrimp maturation with temperature and light controls, and renovations to the East Lagoon facility to house six growout raceways incorporating the latest water treatment equipment for performing experiments on semiclosed system culture of marine organisms.

White shrimp (Penaeus setiferus) have been induced to mature and spawn for the first time in captivity, but no fertilization has taken place. Redfish (Sciaenops ocellata) and black drum (Pogonias chromis) were spawned and juveniles were reared successfully in the hatchery. Improvements were made in rotifer culture techniques, the primary food of these larval fishes. The juvenile redfish were subsequently tagged and released at Galveston State Park as part of a cooperative agreement between NMFS and Texas Parks and Wildlife.

Cooperative studies were carried out with Texas A&M University on shrimp maturation studies and with the University of Houston for engineering development for culture systems. A workshop on aquaculture

Figure 34

Fig. 34 (left) shows a fishery biologist at the Galveston Laboratory feeding Laboratory-reared redfish.

Fig. 35 (right) - Different growth rates occur within the same ridley turtles.

Figure 35

Figure 36.--Experimental set up at Galveston Laboratory to determine disease prevention techniques in Kemp's ridley turtles.

Figure 37.--If ridley turtles are injured during growout phase they are isolated until recovered.

coordination between NMFS and the Gulf Coast States (Alabama, Florida, Louisiana, Mississippi, and Texas) was organized and held at the Galveston Laboratory. One accomplishment was the development of a Gulf Coast Aquaculture Newsletter, which will be published and distributed once or twice a year.

An experimental aquaculture project involving 1,100 hatchling loggerhead sea turtles was completed in 1978 at the Galveston Laboratory. Young turtles were raised for about 10 months. The mortality rate was high owing to disease. Considerable experience and knowledge was obtained during this study for direct application to future projects of this nature. The survivors were tagged and released to sea off the Florida east coast, and in the eastern Gulf of Mexico.

To save the Kemp's ridley turtle, the most endangered marine turtle, a cooperative research program was undertaken in 1978 by the U.S. Fish and Wildlife Service, National Park Service, Texas Parks and Wildlife, Instituto Nacional de Pesca, and the National Marine Fisheries Service. To increase survival, nesting turtles are being protected on Mexican beaches, eggs are collected and protected from coyotes, and hatchlings are raised to larger sizes before being released. The Galveston Laboratory received about 3,000 hatchling turtles in July - August 1978. A new system for handling and maintaining these turtles has been devised, including changes in the holding facilities and the maintenance of high water-quality standards as well as an improved nutritional regime and disease control capability. Although this is an experimental program, survival of cultured turtles is about 70 percent, and almost 2,000 turtles are planned for released in the near future.

As reported previously in this report, a major effort in 1978 involved the relocation of the College Park (Md.) Laboratory to its new facility in Charleston, S.C. Following the move, efforts were centered around the design, construction, and installation of a new aquatic system that can hold many species.

Research continued on the nutritional requirements of Macrobrachium rosenbergii, a large prawn possessing high potential for commercial culture. One series of feeding studies demonstrated that neither animal nor plant sterol additions to the diet produced any better growth rate than a diet containing 32 percent menhaden fish meal. In addition, preliminary studies of the effects of dietary fiber on Macrobrachium revealed a beneficial growth effect due to increasing the fiber level in the diet.

At the Northwest and Alaska Fisheries Center's Auke Bay Laboratory, aquaculture research on salmon ocean ranching in Alaska in 1978 focused on factors affecting the marine survival of juvenile salmon; concepts of brood stock development including relic endemic and transplanted groups of fish; and biological, environmental, and management interactions of hatchery-wild stock relations. Activities at Little Port Walter and Auke Creek research facilities included some work with all five species of eastern Pacific salmon. Effects of specific incubation and rearing treatments on ocean survival were determined by releasing fin-marked and coded wire-tagged groups of fry and smolt. A new program to study salmon survival will test theories on the causes of variable marine survival of juvenile salmon from wild and hatchery stocks.

Highlights of the past year's accomplishments include: important progress in hatchery technology for spring chinook salmon; beginning construction of a new two-way salmon-counting weir at Auke Creek; contract research on historical aspects of salmon aquaculture in Alaska; genetic and environmental studies on mature precocious jacks of chinook and coho salmon; development of a new interlocking flotation module for floating culture systems; important refinements on the floating vertical raceway rearing concept; documenting an unusually high fry-to-adult survival of 19.5 percent for pink salmon; evaluating production-level operation of a new commercially available substrate incubator; determining the efficacy of hyperosmotic Vibrio vaccines on improving ocean survival of juvenile salmon; studying IHN-virus challenge to Alaska and Pacific Northwest stocks of chinook salmon; and participating in a four-nation conference on the biology and culture of Pacific salmon in Yuzhno-Sakhalinsk, U.S.S.R. Many of these highlights cooperatively involved other agencies including the State of Alaska, Oregon State University, and regional aquaculture associations.

Studies at the Manchester Laboratory continued on understanding the role of the hatchery environment in the early development of coho salmon to determine the effect of disease and the state of physiological smoltification on the ability of hatchery stocks to migrate and adapt to seawater, and the relationships, if any, between disease, parr-smolt transformation, and adults in the fishery.

During 1978, the Manchester aquaculture program concentrated on developing effective biochemical indicators to determine the optimum time for release of juvenile salmonids from NMFS-funded hatcheries on the Columbia River. In addition, bacterial and viral diseases were monitored. Findings included:

(1) Thyroxine is a good quantitative measure of the ability of coho salmon to adapt to seawater.

(2) Thyroxine and adenosine triphosphate surges in smolting coho salmon coincide with migration urge.

(3) Precocious males occur in large number (up to 30 percent of all males) in spring chinook stocks, but do not survive in seawater (therefore, they should not be counted towards production).

(4) Up to 90 percent of the fish in some stocks had bacterial kidney disease. About half of all stocks tested had certain viral diseases (IPN).

(5) Enteric redmouth disease affected seriously the ability of fall chinook to smolt and migrate to the estuary.

Studies at the Seattle Laboratory continued on the nutritional requirements of salmonids and the evaluation of alternate protein sources.

Feeding tests with salmonids have established that the poor growth that results when seed meal is substituted for fish meal is related to reduced bioavailability of minerals. Laboratory and feeding tests showed that the nonprotein fraction of the seed meals and phytic acid impairs the bioavailability of minerals.

HABITAT PROTECTION

NOAA is placing particular emphasis upon its habitat protection responsibilities under the Fish and Wildlife Coordination Act (FWCA) and other laws. NMFS established an Office of Habitat Protection in 1978. This office, the NMFS Regions and Centers, and other elements of NOAA are working for measures to protect habitat in Federal water projects, and in permit and license programs. NMFS ecologists assist Federal and state regulatory and planning agencies, by reviewing and commenting on proposed coastal and estuarine developments that may affect aquatic habitats. They also serve on various advisory and technical committees. Through these and other avenues, NMFS supplies expertise to State and Federal planners and decisionmakers.

In cooperation with the Northeast Region, Northeast Fisheries Center, and other NOAA elements, the Office of Habitat Protection has taken the lead role in developing detailed Position Statements on the siting of oil refineries at Eastport, Maine, and Portsmouth, Va. These statements represent major habitat protection efforts in behalf of living marine resources that would be exposed to serious risks from petroleum spills. NOAA's opposition to these projects has helped influence the decisionmaking by the Corps of Engineers and Environmental Protection Agency (EPA) at the highest levels of these regulatory agencies. NMFS also played a lead role in the Chief of Engineers' Interagency Task Force formed to evaluate East Coast refinery sites as alternatives to those proposed for Eastport and Portsmouth. This study, published by the Chief of Engineers, has had a major influence on numerous Federal agency considerations of East Coast energy facility siting issues.

Representing the Secretary of Commerce, NMFS has participated with representatives of the Chief of Engineers in the development of a draft Memorandum of Agreement (MOA) to be signed by the Secretaries of Commerce and the Army as required by Section 404 (q) of the Clean Water Act of 1977. This MOA will establish policies and procedures concerning the evaluation and consideration of permits for the discharge of dredged or fill material into the Nation's waters. Terms of the draft agreement are being negotiated.

By request from the Secretary of Commerce to the Administrator of EPA, NMFS gained recognition of its role in the Fish and Wildlife Coordination Act. NMFS will be concerned with regulations being developed by EPA to implement provisions of the Clean Water Act (CWA). CWA regulates the transfer of portions of the Corps of Engineers' dredge and fill permit program to State administration.

NMFS/NOAA and Department of the Interior jointly have developed draft regulations to interpret and implement FWCA. These highly important regulations define how fish and wildlife resources will be considered during planning and construction of all Federally constructed or Federally approved projects affecting waters of the United States. The regulations are to be signed jointly by the Secretaries of Commerce and the Interior in response to the President's Water Policy Directive.

NMFS is actively participating in the review of Environmental Statutes and Instream Flow Task Forces established by the President's Water Policy Reform Message of June 6, 1978, with emphasis on the drafting of regulations implementing FWCA.

Pursuant to Council on Environmental Quality (CEQ) review of the Corps of Engineers project for hurricane protection and beach erosion control (Fire Island to Montauk Point, N.Y.), NMFS helped develop an environmentally acceptable interim solution to acute beach erosion problems at Westhampton, N.Y. NMFS provided data and information on the overall project plan and continues to negotiate with the Corps of Engineers on marine environmental matters.

NMFS is helping prepare NOAA's response to the National Ocean Pollution Research and Development and Monitoring Act of 1978 (Public Law 95-273). This Act designates NOAA as the lead Federal agency for preparing a comprehensive 5-year plan for a Federal program on ocean pollution research, development, and monitoring. The Act also requires that NOAA have a comprehensive, coordinated, and effective ocean pollution research, development, and monitoring program that is consistent with the 5-year plan.

NMFS contributed to and partially funded a national conference on wetlands values sponsored by the National Wetlands Technical Council. In addition, NMFS participated in and partially funded a national symposium on strategies for fish and wildlife mitigation in connection with Federal projects and permits. The American Fisheries Society sponsored the symposium.

Regional Activities

In the Northwest Region, NMFS was involved in the following activities during 1978:

- Assisted in the design of instream flow studies for salmon and steelhead for the Snohomish River Basin, Wash. Field studies were completed, and minimum instream flows were specified for the entire basin.

- Nine nuclear power units are scheduled for completion in the Northwest during the 1980's.

NMFS has participated in the environmental aspects during the design and construction of these projects and has recommended specific measures for habitat protection, which include the design of intake and discharge facilities, adequate aquatic monitoring programs, and so on. A preoperational monitoring program is scheduled to begin in 1979 for a nuclear unit on the Hanford Reservation, Hanford, Wash.

— The Department of the Interior has released for review, the feasibility report on the Bumping Lake Enlargement Project of the Bureau of Reclamation (BLM). NMFS contributed significantly to the planning of this project in which 70 percent of the new storage is allocated to improving anadromous fish runs. This is one of the first water development projects in the Northwest that includes such improvement as a project feature, and represents a milestone in multiple purpose planning.

The NMFS Southeast Region received for review 58 environmental impact statements, 97 Federal water development projects, 1,239 permit applications for discharge of various pollutants into U.S. waters under the Environmental Protection Agency's National Pollutant Discharge Elimination System Program, and 6,098 applications for permits to perform work in navigable waters. NMFS reviewed and commented on 19 draft documents concerning Coastal Zone Management plans being developed by coastal States, Puerto Rico, and the Virgin Islands.

Historically, the Environmental Assessment Branch has been able to comment on only about 15 percent of the significant projects affecting fishery habitat. In 1978, an attempt was made to correct this deficiency by contracting with participating States and private firms for field investigations at proposed project sites. This pilot contracting program began in July 1978 without any increase in NMFS personnel. Participating States include Alabama, Georgia, Louisiana, North Carolina, Puerto Rico, South Carolina, and the Virgin Islands, with private contractors being used in Florida, Mississippi, and Texas. The goal of this new contracting program is to evaluate and comment on more than 90 percent of the significant permit applications received, thus ensuring that the protection of fishery resources and their habitat is given adequate consideration in management decisions.

Other habitat protection activities included some of the following:

— Planned and participated in EPA/NOAA semiannual project review at the University of Houston. The purposes were to review (1) accomplishments of the first 6 months of the third year of study of how offshore oil and gas operations affected the marine fishery habitat in the Buccaneer Oil Field and (2) the project objective in relation to EPA and NOAA goals and objectives.

— Draft final report on snapper/grouper investigation submitted to BLM/NOAA/NMFS for review and comments.

In the Northeast Region, major issues addressed by NMFS in 1978 centered around proposals for the construction of oil refineries, projects on beach nourishment and hurricane protection, problems, associated with the disposal of dredge spoil, ocean dumping, and resolution of conflicts arising from unauthorized projects in wetlands.

Efforts continued toward better coordination with other agencies and more expeditious handling of project situations. Initial planning for increasing NMFS capabilities for environmental assessment through contracting procedures was undertaken during the year.

Considerable aid was given to EPA in reviewing testimony submitted by the Consolidated Edison Company of New York, Inc., to the National Pollutant Discharge Elimination System adjudicatory hearing on the Hudson River's Indian Point Nuclear Power Plant.

A NMFS position paper was developed in opposition to an EPA decision to permit the siting of an oil refinery by the Pittston Company of New York, Inc., at Eastport, Maine. The position paper contributed to an eventual change in the EPA position, and protected the unique coldwater habitats, diverse communities, and marine mammals in the Passamaquoddy Bay area.

In the Southwest Region, NMFS prepared and implemented a habitat protection policy, which applies to Federally initiated, licensed, or permitted projects, and is designed to protect the Nation's fishery resources and their habitats. The regional statement also sets forth a policy for resource compensation through habitat restoration, enhancement, or offsite acquisition. The intent is to assure that postproject resource values shall be equal to or greater than preproject levels.

As compensation for a Navy fill project in San Diego, Calif., NMFS requested the U.S. Navy to replant eelgrass (Zostera marina) lost during fill activities. About 12,000 plugs of eelgrass were transplanted during February 1978. Surveys completed in August 1978 indicated that those plugs placed between 1 and 4 feet below mean low water were successful. In the first growing season, eelgrass coverage increased by a factor of three over the original coverage.

The Alaska Region's 1978 activities centered essentially in four areas: (1) Outer Continental Shelf (OCS) oil and gas leasing and associated developments, (2) timber harvesting, (3) mining, and (4) coastal zone planning.

NMFS closed the Valdez field station in 1978 because of completion of the Alaska pipeline and the pipeline terminal. Under terms of a new agreement with BLM, NMFS continues operational monitoring of the Valdez terminal by randomly spaced twice-monthly inspection trips. In conjunction with this activity NMFS collected data on living marine resources in Prince William Sound, which the U.S. Geological Survey will use in responding to oil spills there. NMFS also continued subtidal baseline surveys in Port Valdez during 1978.

NMFS provided NOAA's Office of Ocean Management with resource assessments on numerous potential OCS areas for oil and gas leasing, and reviewed BLM's "Draft Study Design for Resource Management Decisions: Oil and Gas Development in the Marine Environment" and the "Alaska Regional Environmental Studies Plan."

In cooperation with the NOAA General Counsel, NMFS participated in threshold consultations under Section 7 of the Endangered Species Act held with the BLM and the Corps of Engineers regarding proposed oil leasing and exploration in the Beaufort Sea.

NMFS was heavily involved in contingency planning for oil spills and participated in two simulated oil spill drills and several actual spill response efforts through the Regional Response Team.

Working through the EPA permit system for effluent discharges, NMFS personnel determined that water intake systems for offshore drilling rigs in the Lower Cook Inlet OCS lease sale did not affect significantly the larval stages of commercially important shellfish by entrainment. This finding allowed the relaxation of protective stipulations.

NMFS continued to help the Alaska Coastal Policy Council and Office of Coastal Management develop guidelines and standards for the Alaska Coastal Management Program (ACMP), and also helped the NOAA Office of Coastal Zone Management review and comment on the discussion paper for ACMP and on proposed final regulations for CZM program development and approval.

Timber harvesting in the Tongass National Forest continued to demand a large share of time through participation on U.S. Forest Service (USFS) interdisciplinary teams. Planning of cutting units for the 1979-84 period a lumber corporation in Ketchikan, Alaska, was completed. Information on anadromous fish and fisheries was provided to USFS for incorporation in its "National Assessment of Wildlife and Fish." Substantial effort was expended in reviewing and commenting on draft environmental impact statements on "RARE II - Roadless Area Review and Evaluation" and the "Tongass Land Use Management Plan."

Ten dives in the submersible NEKTON GAMMA (see fig. 33) were made in two areas in southeastern Alaska to determine if concentrations of wood debris existed in deep waters adjacent to an area of intensive logging and an unlogged area. Limited visibility restricted the area observed to a narrow band ranging from 3 to 10 feet along each transect. Wood debris was sparse on all dives. One transect along the heavily logged area had large amounts.

Habitat Investigations

In the second year of the Ocean Pulse Program, the NMFS Northeast Fisheries Center made three major cruises to assess, monitor, and study the environment in the Continental Shelf (CS) waters of the Northwest Atlantic. In addition, a special station for SCUBA sampling was permanently established on Jeffreys Ledge in the Gulf of Maine.

Through studies of the biological processes of the Northwest Atlantic, Ocean Pulse researchers have shown that (1) most plankton metabolism occurs near the surface; (2) most oxygen depletion occurs in the water and not on the seabed, even in New York Bight disposal areas for dredge spoil and sewage sludge; (3) in the New York Bight and on Georges Bank about 25 percent of phytoplankton production results in dissolved organic matter, a form of no direct value to the food chain that leads to economically important fishes; and (4) the activity of oxydizable organic carbon on the seabed was much higher in 1976 than in 1975 or 1977 in the portion of the New York Bight that had severe oxygen depletion in 1976.

Field sampling and testing of major components of the marine environment during 1978 Ocean Pulse activities included beginning a project with Old Dominion University to examine phytoplankton species composition and population sizes in the Northwest Atlantic; collecting fishes, crabs, and scallops for physiological, biochemical, and bacteriological tests; and collecting sediment and water samples for bacteriological enumeration.

Early findings from the above Ocean Pulse activities were reported at the annual meeting of the International Council for the Exploration of the Sea, and showed that detectable differences were noted in the physiological/biochemical responses of individual organisms, in population structures and sizes, and in community compositions of polluted areas of the Northwest Atlantic.

The NMFS Northwest and Alaska Fisheries Center made a variety of studies that incorporated a number of scientific disciplines. These studies included examinations of avoidance of crude-oil-contaminated sediment by flatfish and crabs; studies of possible pathological changes resulting from long-term exposure of flatfish to crude-oil-contaminated sediment; studies on the uptake, disposition, and excretion of petroleum components by various marine species; studies on the metabolism of hydrocarbons by fish and shellfish and the chemical nature of the metabolites; surveys of selected sites in Puget Sound, Wash., and Prince William Sound, Alaska (in conjunction with the Center's Auke Bay Laboratory), for petroleum contamination; histopathological and chemical analyses of mussels and cockles collected from the site of the AMOCO CADIZ oil spill; test for effects from oil exposure on disease resistance of salmonids and flatfish; studies of relative effects of exposure of fish to a single contaminant and to combinations of that contaminant with other contaminants; studies on effects of petroleum exposure on the development of eggs, embryos, and larvae of salmon that (may) spawn in intertidal areas; studies on effects of water-soluble fractions of oil on swimming performance of salmon; studies on effects of petroleum hydrocarbons on salmon homing behavior; examinations of effects of petroleum on interactions

between sea urchins (prey) and starfish (predator); and field surveys for pathological manifestations in demersal fishes and invertebrates of Alaska Continental Shelf areas and from polluted and reference estuaries of Puget Sound. Results obtained from the experiments ranged from finding no detectable effects from petroleum exposures to the finding of definite effects in oil-exposed groups of animals compared to non-oil-exposed groups. An example of a potentially important finding for predicting the effect of oil spills was the observation that flatfish in laboratory experiments did not avoid sediments heavily contaminated with Prudhoe Bay crude oil. In a two-chambered "choice" apparatus there was no statistically significant difference observed between the number of juvenile English sole "choosing" oil-contaminated sediment after 22 hours and the number of fish on non-oil-contaminated sediment. This clearly suggests that certain flatfish species, at least, would not vigorously avoid petroleum under natural conditions.

The Auke Bay Laboratory environmental programs in 1978 dealt with physiology and with the effects of logging upon fisheries. Physiology investigations have been determining short and long-term effects of oil and oil components on subarctic fish and invertebrates. Highlights of the 1978 efforts include: determination of effects of salinity on oil toxicity with fish and shrimp; determination of effects of temperature on oil accumulation, depuration, and toxicity; determination of the toxicity of water-soluble fractions of natural vs. synthetically produced oil; determination of the accumulation and depuration of oil and oil components in shrimp gonads, and early and mature eggs; determination of long-term accumulation and depuration patterns in early life stages of coho salmon; development of enzyme assay methods to monitor the potential of animals to adapt to oil; determination of the potential for recovery and adaptation of animals after previous exposure to oil to subsequent oil exposure; and the determination of the uptake of oil components in intertidal crabs exposed on a tidal cycle. Results of the above studies are supplying basic information needed to assess potential deleterious effects of short-term or chronic oil exposure on Alaska animals.

Information on the functioning and variability within natural aquatic ecosystems in coastal Alaska has been gained through studies on Porcupine Creek and Steamer Bay. Field work on the stream and the stream/estuary has been completed, and samples for the following studies are being analyzed: habits, growth, and distribution patterns of fish food; annual smolt migration; distribution and abundance of bottom invertebrates; drift of terrestrial and aquatic invertebrates; production and composition of organisms that live attached to underwater surfaces; and winter temperature regimes.

This was the third consecutive year that population sizes of several species of estuarine invertebrates were monitored in the Steamer Bay study area. This study, designed to measure the natural fluctuations of such populations in an undisturbed environment, is an essential step before attempting to measure the biological effects of human-caused perturbations in estuarine systems.

Measured changes in population levels of various invertebrates have been large. In the study area, Dungeness crabs have varied between about 400 and 800 individuals during the study period. Other invertebrates (such as the ascidian Cosella sp.) have shown population variations of a much greater magnitude; others have remained relatively constant. These results verify the need to understand the extent of natural variations before attempting to ascribe variations to unnatural causes.

During 1978, the NMFS Southeast Fisheries Center carried out, reviewed, and commented on environmental impact statements on powerplants in Florida and North Carolina; and consulted with Environmental Assessment Branch personnel on potential impacts of beach nourishment, shell dredging, copper leaching from powerplant cooling towers, sewer outfalls, pesticide additions in the Gulf, dam constructions, oil spills, and salt dome discharges.

NMFS also provided information for testimony on powerplant entrainment and disposal of radioactive wastes; participated in training NOAA personnel in oil spills research; assisted on-scene coordinator in two oil spills in the Southeast Region-Cape Hatteras and Gulf of Mexico; participated as an observer of biological effects of the AMOCO CADIZ oil spill; provided sample analysis of sediments to the State of Florida and EPA; cooperated in a sampling program for larval fish associated with a nuclear powerplant; provided chlorphyll analyses for the State of Florida; submitted to the Department of Energy a 600-page annual report on FY 1978 research activities; and published 15 manuscripts in open scientific literature.

NMFS also performed experimental studies which showed that the abundance of late larval stages in estuarine and nearshore environments can be underestimated significantly because of net avoidance.

Sampling for fish and crabs within an estuarine system indicated that nekton abundance was greatest in seagrass beds, Spartina marshes, and Juncus marsh creeks. The decaying plant matter produced in seagrass beds, and Spartina and Juncus marshes was shown to support detrital feeding representatives of polychaete worms and zooplankton, both of which are consumed by larval, juvenile, and adult fishes in these habitats. Seagrass was shown to accumulate zinc from both sediment and seawater, and herbivores were shown to effect trace metal budgets indirectly by fragmenting the seagrass and accelerating its rate of decomposition. Bacterial production was maximum in the low saline area of estuaries, and maximum bacterial abundance was associated with high levels of plant pigments in the water. This portion of the estuary maintains a bottom invertebrate population that may filter the bacteria and that is eaten by juvenile fishes which enter the area in spring and early summer.

Use of a technique to count the growth rings on larval otoliths (ear bones) allowed description of the

development and daily growth rates of larval spot (Leiostomus xanthurus), and determination of when their eggs hatch. With this knowledge, an energy budget was developed for spot.

A model was developed for larval Atlantic silversides (Menidia menidia) exposed to powerplant entrainment. Swimming speeds for both menhaden (Brevoortia tyrannus) and mullet (Mugil cephalis) were related to impingement in powerplant intakes. Experiments with varying light conditions showed that the photoperiod significantly influenced the resistance of juvenile menhaden to upper lethal temperatures, independent of acclimation temperature. Therefore, this factor must be considered in designing thermal shock studies for larval fish.

MARINE FISHERIES ADVISORY COMMITTEE

The Marine Fisheries Advisory Committee (MAFAC) was established February 17, 1971, by the Secretary of Commerce under Reorganization Plan No. 4 of July 1970, Executive Order 11007, and 15 U.S.C. 713C-3.

MAFAC functions as an advisory body. Its members are appointed by the Secretary of Commerce to advise on the Department's responsibilities for fishery resources and on means to facilitate cooperation between public and private interests in these matters.

The Committee held the following meetings in 1978:

- MAFAC XIX - January 31 to February 2, in Washington, D.C.;
- MAFAC XX - May 2-4, in Washington, D.C.; and
- MAFAC XXI - October 26-27, in Kona, Hawaii

MAFAC Subcommittees held the following meetings in 1978:

- Subcommittee on Marine Recreational Fisheries and Subcommittee on Consumer Affairs met January 31, in Washington, D.C.;
- Subcommittee on Amendments to the FCMA met on March 2-3, in Washington, D.C.; and
- Subcommittee on NMFS Budget met on May 2, in Washington, D.C.

As of December 31, 1978, MAFAC had 27 members. The membership was:

Chairman: Richard A. Frank, Administrator
National Oceanic and Atmospheric Administration

H. Heber Bell
H. Bell and Sons
726 28th Street South
St. Petersburg, FL 33712

John T. Campbell
Campbell Music Service, Inc.
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& Director, Georgia Sea Grant Program
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and Game
1416 Ninth Street
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Executive Secretary
Atlantic Offshore Fish & Lobster Association
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President
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Conn Brown Harbor
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Passenger Fishing Vessel Association
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Stephen B. Mathews
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& Economic Resources
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Program
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Phyllis Bentz
Executive Secretary, MAFAC
National Marine Fisheries Service, NOAA
U.S. Department of Commerce
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MAJOR LITIGATION

Globe Fur Dyeing Corporation v. The United States of America, Juanita Kreps, Richard Frank, and Robert W. Schoning, Civil No. 78-0693 (D.D.C. 1978).

The Globe Fur Dyeing Corporation sought to have Section 102(b)(2) of the Marine Mammal Protection Act declared unconstitutional. This provision prohibits the importation of marine mammals including raw, dressed, or dyed fur or skin, if the mammal was nursing at the time of taking or less than 8 months old, whichever occurs later. The plaintiff imported animal skins before passage of the Act.

On November 16, 1978, Judge Louis Oberdorfer held that the challenged provision was not unconstitutional and granted the Defendant's (the United States) Motion for Summary Judgment. Judge Oberdorfer found this provision rationally related to the goals of the Act, such as conservation and preservation of aesthetic and ethical values. The plaintiff has appealed the decision.

LeVasseur, Sipman and White v. Atkinson, Schoning, the University of Hawaii, Marine Animal Productions, Inc., and John Does 1-30, Civil No. 78-0195 (D.C. Ha., 1978).

The plaintiffs, LeVasseur, Sipman, and White, sued to prohibit the capture and transport of four dolphins to a scientific research facility at the University of Hawaii. NMFS had issued a scientific research permit to allow these activities. Plaintiffs alleged that the dolphins would suffer injury at this facility, that the facility failed to meet the standards required by the Act, and that NMFS had violated the requirements of the National Environmental Policy Act (NEPA) in issuing this and other scientific research permits.

On June 2, 1978, the date the complaint was filed, Federal Judge Samuel B. King issued a Temporary Restraining Order to stop NMFS and its agents and representatives from capturing the dolphins. On June 7, Judge King rejected plaintiffs' second Motion for a Temporary Restraining Order to expand or

extend the first order, because the period for judicial review of permits provided for by the Act had expired before the plaintiffs filed suit.

On November 29, 1978, plaintiffs filed an amended complaint.

Hopson v. Kreps, No. A78-184 Civil U.S. District Court for the District of Alaska

The plaintiffs are Alaska natives seeking to avoid regulations that restrict their taking bowhead whales. In 1977, the International Whaling Commission (IWC) determined that the bowhead whale should be protected and placed quotas on subsistence bowhead takings. The United States is a party to IWC and has implemented these quotas under the authority of the Whaling Convention Act of 1949. Plaintiffs argue that the IWC and the Whaling Convention Act do not authorize any regulation of native subsistence whaling and that the United States cannot impose any restrictions on the native take of bowheads.

On January 11, 1979, Judge Van der Heydt dismissed plaintiffs' action, because the U.S. regulations enforcing the IWC quotas are so directly linked to the conduct of U.S. foreign relations. The Judge has refused to reconsider his decision, and the plaintiffs are expected to file a notice of appeal with the U.S. Court of Appeals for the Ninth Circuit.

Cayman Turtle Farm, Ltd., v. Cecil D. Andrus, et al.

This suit was brought against the Departments of the Interior and Commerce in the U.S. District Court for the District of Columbia by the Cayman Turtle Farm, Ltd. It challenges regulations jointly issued by the two agencies to protect threatened and endangered populations of green sea turtles. The plaintiff claims that the regulations are arbitrary and capricious for failing to provide a special exemption for imports into the United States of products from sea turtles raised on its turtle breeding farm on Grand Cayman Islands in the Bahamas. The agencies' opposition to the amendment is based primarily on their belief that an exemption would stimulate a market for green sea turtle products that would ultimately be satisfied from wild populations of this depleted species. The District Court has recently upheld the NMFS regulations as based on substantial evidence and in compliance with the provisions of the Act.

LEGISLATION

The Pelly Amendment

Section 8 of the Fishermen's Protective Act of 1967, as amended (22 U.S.C. 1978) authorizes the Secretary of Commerce to certify to the President that foreign nationals "are conducting fishing operations in a manner or under circumstances which diminish the effectiveness of an international fishery conservation program." The President may then direct the Secretary to prohibit the importation of fish products from the country in question.

Under a 1978 amendment to Section 8, if foreign nationals engage in "trade or taking which diminishes the effectiveness of any international program for endangered or threatened species," the Secretary of Commerce or the Secretary of the Interior shall certify such fact to the President and the President may then act to prohibit the importation of wildlife products from the country in question (Public Law 95-376). Thus, Pelly Amendment action now may take place in the arena of international endangered species programs, as well as international fishery conservation programs.

The Endangered Species Act Amendments of 1978

The most important change in the Endangered Species Act resulting from the 1978 Amendment is the creation of an interagency Endangered Species Committee empowered to grant permanent exemptions from the Act. The votes of at least five members of the seven-member Committee, which includes the NOAA Administrator, are needed to grant an exemption.

The amendments also add a new definition of critical habitat that requires a finding that an area is "essential for the conservation of the species" before it may be considered critical. Furthermore, when listing a species NMFS must, except in rare instances, concurrently designate areas that are critical habitat for that species. These requirements, plus new public notice and comment provisions, may make it more difficult to list new species and designate areas critical to their survival.

There were also significant new additions of Section 7 of the Act dealing with interagency cooperation requirements. The basic Section 7 requirement that every Federal agency must ensure that its actions do not jeopardize listed species remains intact. However, NMFS is now under a 90-day time limitation when responding to the requests of other agencies for opinions on the impacts of a Federal action on listed species or critical habitat. Section 7 also provides that NMFS shall prepare recovery plans for all listed species within its jurisdiction.

PROGRAM PLANNING AND BUDGET

To fund fishery activities in fiscal year (FY) 1979 (October 1, 1978, to September 30, 1979), $104,101,600 was available as of October 1, 1978: direct appropriations of $86,430,200 and Saltsonstall-Kennedy (S-K) funds of $17,671,400. Congress provided net increases of $13,084,000 over the FY 1978 adjusted base (see table 12).

Table 12.--Fiscal year 1979 NMFS budget allocations by subactivity

Subactivity	Adjusted base FY 1979	Net Congressional increase	Total FY 1979
	Thousands of dollars		
Marine Resources Assessment, Monitoring, and Prediction (MARMAP)			
Direct appropriations	$19,177.7	$1,026.0	$20,203.7
S-K funds	3,527.7	---	3,527.7
Total	22,705.4	1,026.0	23,731.4
Conserving Marine Resources			
Direct appropriations	18,693.5	2,288.0	20,981.5
S-K funds	387.9	---	387.9
Total	19,081.4	2,288.0	21,369.4
Restoring and increasing fishery resources			
Direct appropriations	9,591.1	3,340.0	12,931.1
S-K funds	311.3	---	311.3
Total	9,902.4	3,340.0	13,242.4
Managing and using fishery resources			
Direct appropriations	25,601.5	6,452.0	32,053.5
S-K funds	13,444.5	---	13,444.5
Total	39,046.0	6,452.0	45,498.0
Fishery financial support services			
Direct appropriations	282.4	-22.0	260.4
S-K funds	-----	-----	-----
Total			
Direct appropriations	73,346.2	13,084.0	86,430.2
S-K funds	17,671.4	---	17,671.4
Total	91,017.6	13,084.0	$104,101.6

Does not include management fund (MF) amount of $14,164,300. The MF is distributed among all the subactivities, and accounts for any variances between the Administration's FY 1979 budget to Congress and those figures appearing in this report.

S-K availability determined by import duties collected. Includes S-K reserve releases from deferral by Senate Resolution 50.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Washington, D.C. 20235

NOAA--S/T 79-275